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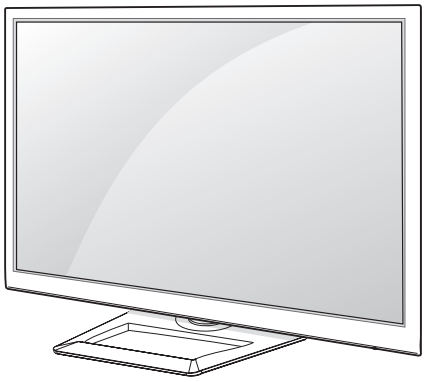
PLASMA TV
SERVICE MANUAL

CHASSIS : PD22A

MODEL : 50PM670S 50PM670S-ZA

CAUTION
BEFORE SERVICING THE CHASSIS,
READ THE SAFETY PRECAUTIONS IN THIS MANUAL.



P/NO : MFL67461701 (1112-REV00)

Printed in Korea

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SAFETY PRECAUTIONS

IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by ⚠ in the Schematic Diagram and Exploded View.
It is essential that these special safety parts should be replaced with the same components as recommended in this manual to prevent Shock, Fire, or other Hazards.
Do not modify the original design without permission of manufacturer.

General Guidance

An **isolation Transformer should always be used** during the servicing of a receiver whose chassis is not isolated from the AC power line. Use a transformer of adequate power rating as this protects the technician from accidents resulting in personal injury from electrical shocks.

It will also protect the receiver and it's components from being damaged by accidental shorts of the circuitry that may be inadvertently introduced during the service operation.

If any fuse (or Fusible Resistor) in this TV receiver is blown, replace it with the specified.

When replacing a high wattage resistor (Oxide Metal Film Resistor, over 1 W), keep the resistor 10 mm away from PCB.

Keep wires away from high voltage or high temperature parts.

Before returning the receiver to the customer,

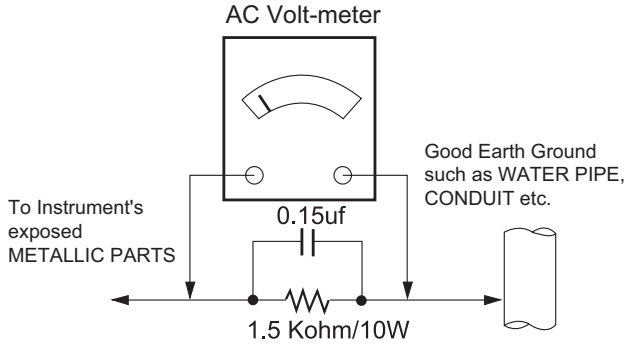
always perform an **AC leakage current check** on the exposed metallic parts of the cabinet, such as antennas, terminals, etc., to be sure the set is safe to operate without damage of electrical shock.

Leakage Current Cold Check(Antenna Cold Check)
With the instrument AC plug removed from AC source, connect an electrical jumper across the two AC plug prongs. Place the AC switch in the on position, connect one lead of ohm-meter to the AC plug prongs tied together and touch other ohm-meter lead in turn to each exposed metallic parts such as antenna terminals, phone jacks, etc.
If the exposed metallic part has a return path to the chassis, the measured resistance should be between 1 MΩ and 5.2 MΩ.
When the exposed metal has no return path to the chassis the reading must be infinite.
An other abnormality exists that must be corrected before the receiver is returned to the customer.

Leakage Current Hot Check (See below Figure)
Plug the AC cord directly into the AC outlet.

Do not use a line Isolation Transformer during this check.
Connect 1.5 K / 10 watt resistor in parallel with a 0.15 uF capacitor between a known good earth ground (Water Pipe, Conduit, etc.) and the exposed metallic parts.
Measure the AC voltage across the resistor using AC voltmeter with 1000 ohms/volt or more sensitivity.
Reverse plug the AC cord into the AC outlet and repeat AC voltage measurements for each exposed metallic part. Any voltage measured must not exceed 0.75 volt RMS which is corresponds to 0.5 mA.
In case any measurement is out of the limits specified, there is possibility of shock hazard and the set must be checked and repaired before it is returned to the customer.

Leakage Current Hot Check circuit



When 25A is impressed between Earth and 2nd Ground for 1 second, Resistance must be less than 0.1
*Base on Adjustment standard

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SPECIFICATION

NOTE : Specifications and others are subject to change without notice for improvement.

1. Application range

This spec sheet is applied all of the PDP TV with PD22A chassis.

2. Requirement for Test

Each part is tested as below without special appointment.

(1) Temperature: 25 °C ± 5 °C(77 °F ± 9 °F), CST: 40 °C ± 5 °C

(2) Relative Humidity: 65 % ± 10 %

(3) Power Voltage

: Standard input voltage (AC 100-240 V~, 50/60 Hz)

* Standard Voltage of each products is marked by models.

(4) Specification and performance of each parts are followed each drawing and specification by part number in accordance with BOM.

(5) The receiver must be operated for about 5 minutes prior to the adjustment.

3. Test method

(1) Performance: LGE TV test method followed

(2) Demanded other specification

- Safety : CE, IEC specification
- EMC : CE, IEC

4. Module General Specification

- 50" 3D FHD

No	Item	Specification	Remark
1	Display Screen Device	127 cm (50 inch) wide Color Display Module	PDP
2	Aspect Ratio	16:9	
3	PDP Module	PDP50R4####, RGB Closed (Well) Type, Glass Filter (43%) Pixel Format: 1920 horiz. By 1080 ver.	
4	Operating Environment	5) Temp. : 0 ~ 40 deg 6) Humidity : 20 ~ 80%	LGE SPEC
5	Storage Environment	7) Temp. : -20 ~ 60 deg 8) Humidity : 10 ~ 90 %	
6	Input Voltage	AC100 ~ 240V, 50/60Hz	Maker LG

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5. Model General Specification

No	Item	Specification	Remark
1	Market	Albania, Austria, Belgium, Bosnia, Bulgaria, Coratia, Czech, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Kazakhstan, Latvia, Lithuania, Luxembourg, Morocco, Netherlands, Norway, Poland, Portugal, Romania, Russia, Serbia, Slovenia, Spain, Sweden, Slovakia, Switzerland, Turkey, Ukraine, UK	
2	Broadcasting system	1) PAL/SECAM BG 2) PAL/SECAM DK 3) PAL I / II 4) SECAM L/L' 5) DVB T / T2 6) DVB C 7) DVB S	EU (PAL Market) Supporting T2 is only for *PM***T./W Supporting S is only for **PM***S/G
3	Receiving system	Analog : Upper Heterodyne Digital : COFDM	► DVB-T - Guard Interval(Bitrate_Mbit/s) 1/4, 1/8, 1/16, 1/32 - Modulation : Code Rate QPSK : 1/2, 2/3, 3/4, 5/6, 7/8 16-QAM : 1/2, 2/3, 3/4, 5/6, 7/8 64-QAM : 1/2, 2/3, 3/4, 5/6, 7/8 ► DVB-C - Symbolrate : 4.0Msymbols/s to 7.2Msymbols/s - Modulation : 16QAM, 64-QAM, 128-QAM and 256-QAM ► DVB-S - symbolrate DVB-S2 (8PSK / QPSK) : 2 ~ 45Msymbol/s DVB-S (QPSK) : 2 ~ 45Msymbol/s - viterbi DVB-S mode : 1/2, 2/3, 3/4, 5/6, 7/8 DVB-S2 mode : 1/2, 2/3, 3/4, 3/5, 4/5, 5/6, 8/9, 9/10
4	Scart Jack (1EA)	PAL, SECAM	Scart 1 Jack is Full scart and support RF-OUT(Analog), MNT-OUT
5	Video Input (1EA)	PAL, SECAM, NTSC	Rear Hybrid Jack Type
6	Component Input (1EA)	Y/Cb/Cr, Y/ Pb/Pr	
7	RGB Input (1EA)	RGB-PC	Analog (D-Sub 15Pin)
8	HDMI Input (2 or 3EA)	HDMI-PC HDMI-DTV	HDMI1, HDMI2(DVI) , HDMI3, HDMI4
9	Audio Input (2EA)	RGB/DVI Audio, Component	L/R Input
10	SPDIF Out (1 EA)	SPDIF Out	
11	USB (1EA)	For SVC, S/W Download, X-Studio, DivX	
12	Ethernet LAN(1EA)		
13	PCMCI (1EA)	Common Interface	

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ADJUSTMENT INSTRUCTION

1. Application Range

This spec. sheet applies to PD22A chassis applied PDP TV all models manufactured in TV factory.

2. Specification

(1) Because this is not a hot chassis, it is not necessary to use an isolation transformer. However, the use of isolation transformer will help protect test instrument.
(2) Adjustment must be done in the correct order.
(3) The adjustment must be performed in the circumstance of 25 °C ± 5 °C of temperature and 65±10% of relative humidity if there is no specific designation.
(4) The input voltage of the receiver must keep 100~240V, 50/60Hz.
(5) The receiver must be operated for about 5 minutes prior to the adjustment when module is in the circumstance of over 15 °C

- In case of keeping module is in the circumstance of 0°C, it should be placed in the circumstance of above 15°C for 2 hours
- In case of keeping module is in the circumstance of below -20 °C, it should be placed in the circumstance of above 15 °C for 3 hours,.

■ After RGB Full White in HEAT-RUN Mode, the receiver must be operated prior to the adjustment.
■ Enter into HEAT-RUN MODE
1) Press the POWER ON KEY on R/C for adjustment.
2) OSD display and screen display PATTERN MODE.
● Set is activated HEAT run without signal generator in this mode.
● Single color pattern (WHITE) of HEAT RUN MODE uses to check panel.
● Caution : If you turn on a still screen more than 20 minutes (Especially digital pattern, cross hatch pattern), an after image may be occur in the black level part of the screen.

3. PCB Assembly adjustment

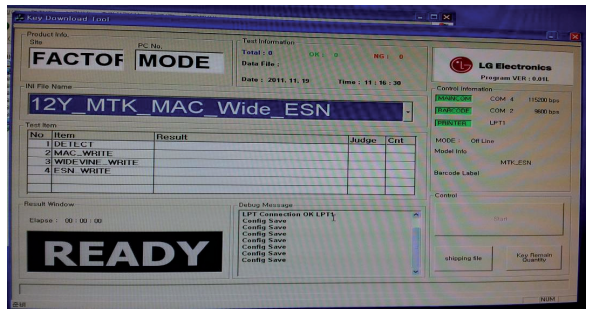
* Caution : Using 'power on' button of the control R/C power on TV

3.1. MAC Address and ESN and Wide-vine Key Download

* The CI+ Key download is need for only PD22A/B/C Models.
* Connect TV SET and PC which download keys Writing program by RS232C-Cable

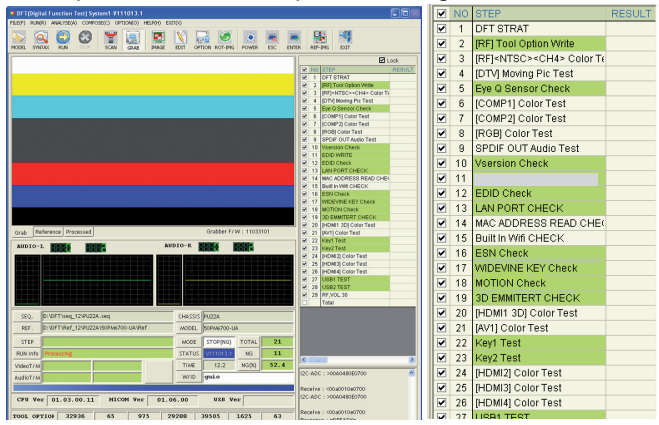
(1) Start Program and Click 'start' Button to connect TV and PC.
(2) When download succeed, you can see "OK" on the screen.

* Each Chassis has it's own MAC Address/ESN/Wide-vine key. Please be careful of download.



3.2. DFT Process

* Depend on situation, Step can be changed.



* Condition spec

Mode	Volume	Power Off
RF	0	DC On

3.3. Tool OPTION (MANUAL)

(1) Press ADJ key on R/C to insert Tool OPTION
(2) On the " Tool Option ", Insert Tool Option by a number key
(3) Press the ENTER(■)
(4) Press ENTER(■) again.
(5) Select "OK to Download" by using ◄/►(VOL +/-) and press ►(VOL +)

* PD22A						
Model Name		PM970S	PM690S	PM680S	PM670S	PM470S
Tool option 1	42 HD					33062
	50 HD					33064
	50 FHD	32808	32904	32920	32936	
	60 FHD	32810	32906	32922	32938	
Tool option 2	42 HD					66
	50 HD					66
	50 FHD	65	65	65	65	
	60 FHD	65	65	65	65	
Tool option 3		973	973	973	973	845
Tool option 4		29290	29290	29290	29290	29290
Tool option 5		47703	47703	47703	47701	14933
Tool option 6		1561	1561	1561	1561	1561
Tool option 7		8239	9263	8239	8239	8239
In case of France, Tool Option 5 is 47959/47959/47959/47957/15189.						

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3.4. EDID (The Extended Display Identification Data)

■ RGB [C/S: B1] : For FHD Models
EDID Block 0, Bytes 0-127 [00H-7FH]
Block Type: EDID 1.3

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01	01	01
10	01	16	01	03	68	A0	5A	78	0A	EE	91	A3	54	4C	99	26
20	0F	50	54	A1	08	00	31	40	45	40	61	40	81	80	01	01
30	01	01	01	01	01	01	02	3A	80	18	71	38	2D	40	58	2C
40	45	00	40	84	63	00	00	1E	66	21	50	B0	51	00	1B	30
50	40	70	36	00	40	84	63	00	00	1E	00	00	00	FD	00	3A
60	3E	1E	53	10	00	0A	20	20	20	20	20	20	00	00	00	FC
70	00	4C	47	20	54	56	0A	20	20	20	20	20	20	20	00	B1

■ HDMI [C/S: 9804] : For FHD Models
Block Type: EDID 1.3

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01	01	01
10	01	16	01	03	80	A0	5A	78	0A	EE	91	A3	54	4C	99	26
20	0F	50	54	A1	08	00	31	40	45	40	61	40	81	80	01	01
30	01	01	01	01	01	01	02	3A	80	18	71	38	2D	40	58	2C
40	45	00	40	84	63	00	00	1E	66	21	50	B0	51	00	1B	30
50	40	70	36	00	40	84	63	00	00	1E	00	00	00	FD	00	3A
60	3E	1E	53	10	00	0A	20	20	20	20	20	20	00	00	00	FC
70	00	4C	47	20	54	56	0A	20	20	20	20	20	20	20	01	98

EDID Block 1, Bytes 128-255 [80H-FFH]
Block Type: CEA EDID Timing Extension Version 3

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	02	03	37	F1	4E	10	9F	04	13	05	14	02	03	12	20	22
10	15	21	01	26	15	07	50	09	57	07	78	03	0C	00	10	00
20	B8	2D	20	C0	0E	01	4F	3F	FC	08	10	18	10	06	10	16
30	10	28	10	E3	05	03	01	02	3A	80	18	71	38	2D	40	58
40	2C	45	00	40	84	63	00	00	1E	01	1D	80	18	71	1C	16
50	20	58	2C	25	00	40	84	63	00	00	9E	01	1D	00	72	51
60	D0	1E	20	6E	28	55	00	40	84	63	00	00	1E	0E	1F	00
70	80	51	00	1E	30	40	80	37	00	40	84	63	00	00	1C	04

* CheckSum & Physical Address Table.
- Each HDMI Input has their own physical address(on Address:9E). So, each HDMI Input has different C/S value.

■ HDMI INPUT Physical Address Table

Address	HDMI1	HDMI2	HDMI3	HDMI4
9E	10	20	30	40

■ HDMI INPUT C/S Table.
- FHD

	HDMI1	HDMI2	HDMI3	HDMI4
CheckSum	9804	98F4	98E4	98D4

4. SET assembly adjustment method

* Caution: Each PCB assembly must be checked by check JIG set. (Because power PCB Assembly damages to PDP Module, especially be careful)

4.1. POWER PCB Assembly Voltage adjustment

(Va, Vs voltage adjustment)
Test equipment : D.M.M 1EA
Connection Diagram for Measuring : refer to fig.4
Adjustment method

4.1.1. Va adjustment

(1) Connect + terminal of D. M.M. to Va pin of P811, connect -terminal to GND pin of P811.
(2) After turning VR502,voltage of D.M.M adjustment as same as Va voltage which on label of panel right/top (deviation; ±0.5V)

4.1.2. Vs adjustment

(1) Connect + terminal of D. M..M. to Vs pin of P811, connect -terminal to GND pin of P811.
(2) After turning VR901, voltage of D.M.M adjustment as same as Vs voltage which on label of panel right/top (deviation ; ±0.5V)

4.2. Adjustment of White Balance

- Required Equipment
- Remote controller for adjustment
- Color Analyzer (CS-1000, CA-210 or same product : CH 10 (PDP)
  * Please adjust CA-210 by CS-1000 before measuring
- Auto W/B adjustment instrument(only for Auto adjustment)
- 9 Pin D-Sub Jack(RS232C) is connected to the AUTO W/B EQUIPMENT

Before Adjust of White Balance, Please press POWER ONLY key

- Adjust Process will start by execute RS232C Command.
- Color temperature standards according to CSM and Module

CSM	PLASMA
Cool	11000K
Medium	9300K
Warm	6500K

- CS-1000/CA-100+/CA-210(CH 10) White balance adjustment coordinates and color temperature.

CSM	Color Coordination		Temp	± Color Coordination
	x	y		
COOL	0.276	0.283	11000K	0.002
MEDIUM	0.285	0.293	9300K	0.002
WARM	0.313	0.329	6500K	0.002

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* Manual W/B process (using adjusts Remote control)
- Please Adjust in AV 1 MODE, Turn off Energy Saving Mode.
  1) Enter 'PICTURE RESET' on Picture Mode, and then turn off Fresh Contrast and Fresh colour in Advanced Control
  2) After enter Service Mode by pushing "ADJ" key,
  3) Enter White Pattern off of service mode, and change off -> on.
  4) Enter "W/B ADJUST" by pushing "►" key at "3. W/B ADJUST".

* Gain Max Value is 192. So, Never make any Gain Value over 192 and please fix one Value on 192, between R, G

	Min	Typ	Max
R-GAIN	0	192	192
G-GAIN	0	192	192
B-GAIN	0	192	192

and B.

* Auto-control interface and directions
(1) Adjust in the place where the influx of light like floodlight around is blocked. (Illumination is less than 10ux).
(2) Measure and adjust after sticking the Color Analyzer (CA-100+, CA210) to the side of the module.
(3) Aging time
- After aging start, keep the Power on (no suspension of power supply) and heat-run over 5 minutes

* Auto adjustment Map (RS232C)

No	Index	CMD1	CMD2	Set ID	Data
1	Start	w	b	0	00
2	Gain Start	w	b	0	10
3	Gain End	w	b	0	1F
4	Offset Start	w	b	0	20
5	Offset End	w	b	0	2F
6	End	w	b	0	FF
7	Medium R	j	a	0	00~FF
8	Medium G	j	b	0	00~FF
9	Medium B	j	c	0	00~FF
10	Warm R	j	d	0	00~FF
11	Warm G	j	e	0	00~FF
12	Warm B	j	f	0	00~FF
13	Cool R	j	g	0	00~FF
14	Cool G	j	h	0	00~FF
15	Cool B	j	i	0	00~FF
16	Cool R,G,B	j	j	0	00~FF
17	Medium	j	k	0	00~FF
18	Warm	j	l	0	00~FF

4.3. Serial number download & Model name D/L.

(1) Press "Power on" button of a service R/C.(Baud rate : 115200 bps)
(2) Connect RS232-C Signal Cable and start 'Option Check Program Ver3.8'
(3) Scan serial Number and press 'F5' button.
(4) Check 'OK' on program 1) program.
(5) Press 'In start' button on SVC R/C, check Serial Number and Model Name.

4.4. Check Tool Option and write Country Group & Area Code(Option) D/L

- Refer to Table 3.3 insert tool option.

Chassis Name		PD22A		
Suffix		EU, PF, EU	PD, RU, DR, DK	PI
Area Option		130	386	418
Nordic UI	0~1	0	0	0
Use HW Option	0~1	1	1	1
T2	0~1	0	0	0
C2	0~1	0	0	0
Satellite	0~1	0	0	0
MHP	0~1	0	0	1
HBBTV	0~1	2	2	2
Isolator	0~1	0	1	1

Country Group	Market	Area Option
AJ	Myanmar Etc.	257
	Australia, New Zealand Singapore, Malaysia	263
	Indonesia	262
	Vietnam	261
	Thailand	16647
	Sri Lanka	17671
	India	18183
JA	Irap, Lybia, Yemen, Syria, Sudan, West Afria Ect.	257
	South Africa ,Alegeria, Tunisia, Kuwait, Oman, Kenya, Uganda Palestine(SBITANY)	259
	Qatar Nigeria	260
	U.A.E Saudi Arabia Barhrain	261
	Egypt, Iran, Jordan Lebanon	263
	Pakistan	16642
IL	Israel(H.Y.E)	259

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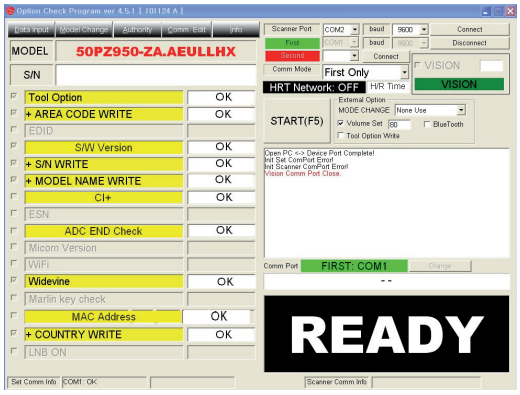


4.5. Checking the EYE-Q Operation.

(1) Press the EYE Key on the adjustment remote controller.
(2) Check the Sensor DATA (It must be under 10) and keep the data longer than 1.5s
(3) Check 'OK'

Green Eye-Check(Factory Mode)	
Sensor Data	9
Power saving mode	1
	OK

(Sensor DATA 0 ~ 4095, Power Saving Mode 0 ~ 12)
* IF you press IN-STAP Button, change Green Eye-check OSD.

4.6. PING TEST

* In this case Network setting is on Manual Setting.

SET — PC

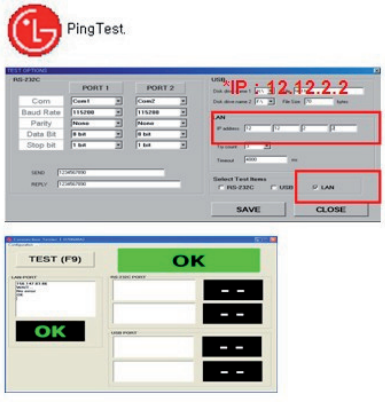
Connect : SET->LAN Port == PC->LAN Port

4.6.1. Equipment Setting

(1) Play the LAN Port Test PROGRAM.
(2) Input IP set up for an inspection to Test
* IP Number : 12.12.2.2

4.6.2. LAN PORT inspection (PING TEST)

* In this case Network setting is on Manual Setting.
(1) Play the LAN Port Test Program.
(2) connect each other LAN Port Jack.
(3) Play Test (F9) button and confirm OK Message.
(4) remove LAN CABLE



4.7. Magic Motion Remote Controller test

(1) Equipment: RF R/C for test,
(2) You must confirm the battery power of RF-R/C before test (Recommend that change the battery per every lot)
(3) Sequence (test)
1) if you select the 'start key(Wheel Key)' on the controller, you can pairing with the TV SET.
2) You can check the cursor on the TV Screen, when select the 'Wheel Key' on the controller
3) You must remove the pairing with the TV Set by select 'Mute Key' on the controller.

4.8. 3D function test

- Required Equipment
● Pattern Generator :
MSHG-600, MSPG-6100 [SUPPORT HDMI1.4])
MODE : HDMI mode NO. 872
Pattern No.83

(1) Please input 3D test pattern like below (HDMI mode NO. 872 , pattern No.83)

Fig.1
<HDMI Mode 872번 , Pattern No. 83>

(2) When 3D OSD appear automatically, then press OK button on ADJ Remote Controller.
(3) Check the picture. The picture must be same as below. (Don't have to wear 3D glasses.)

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4.9. LNB voltage and 22KHz tone check (only for *PM**0S)

(1) Test method

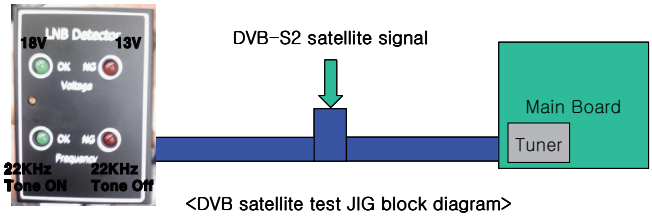
1) Press "Power on" button of a service R/C.(Baud rate : 115200 bps)
2) Connect cable between satellite ANT and test JIG.
3) Connect RS232-C Signal Cable.
4) Write LNB ON control command through RS-232-C.
5) check LED light 'ON' at 18V menu.
6) check LED light 'ON' at 22KHz tone menu.
7) Write LNB OFF control command through RS-232-C.
8) check LED light 'OFF' at 18V menu.
9) check LED light 'OFF' at 22KHz tone menu.

(2) RS-232 command for test LNB

	Command	Set ACK
LNB On	[A][I][ ][Set ID][ ][30][Cr]	[O][K][x] or NG : [N][G][x]
LNB Off	[A][I][ ][Set ID][ ][40][Cr]	[O][K][x] or NG : [N][G][x]

(3) Test result

- After send LNB On command, '18V LED' and '22KHz tone LED' should be ON.
- After send LNB OFF command, '18V LED' and '22KHz tone LED' should be OFF.



<DVB satellite test JIG block diagram>

<Remark> After the measurement conditions witnessed in the last state.

5. Set Information (Serial No & Model name)

5.1. check the serial number & Model Name

(1) Push the menu button and press red button on R/C to enter 'Customer Support'menu.
(2) Move to 'signal test' menu. And check Serial No & Model Name Select the STATION -> Diagnostics -> To set

6. SW Download Guide.

* Before put a *.epk to USB Stick make 'LG_DTV' folder in USB. Then, put *.epk file to 'LG_DTV' folder and Turn on TV

(1) Put the USB Stick to the USB socket
(2) Automatically detecting update file in USB Stick
  * If your downloaded program version in USB Stick is Low, it didn't work.
  But your downloaded version is High, USB data is automatically detecting.
(3) Show the message "Copying files from memory"
(4) Updating is staring.
(5) Updating Completed, The TV will restart automatically.
  After turn on TV, Please press 'IN-STOP' button on ADJ Remote-control.
  * IF you don't have ADJ R/C, enter 'Factory Reset' in OPTION MENU.
(6) When TV turns on, check the Updated version on Product/ Service Info. MENU.
  * After downloading, have to adjust TOOL OPTION again.

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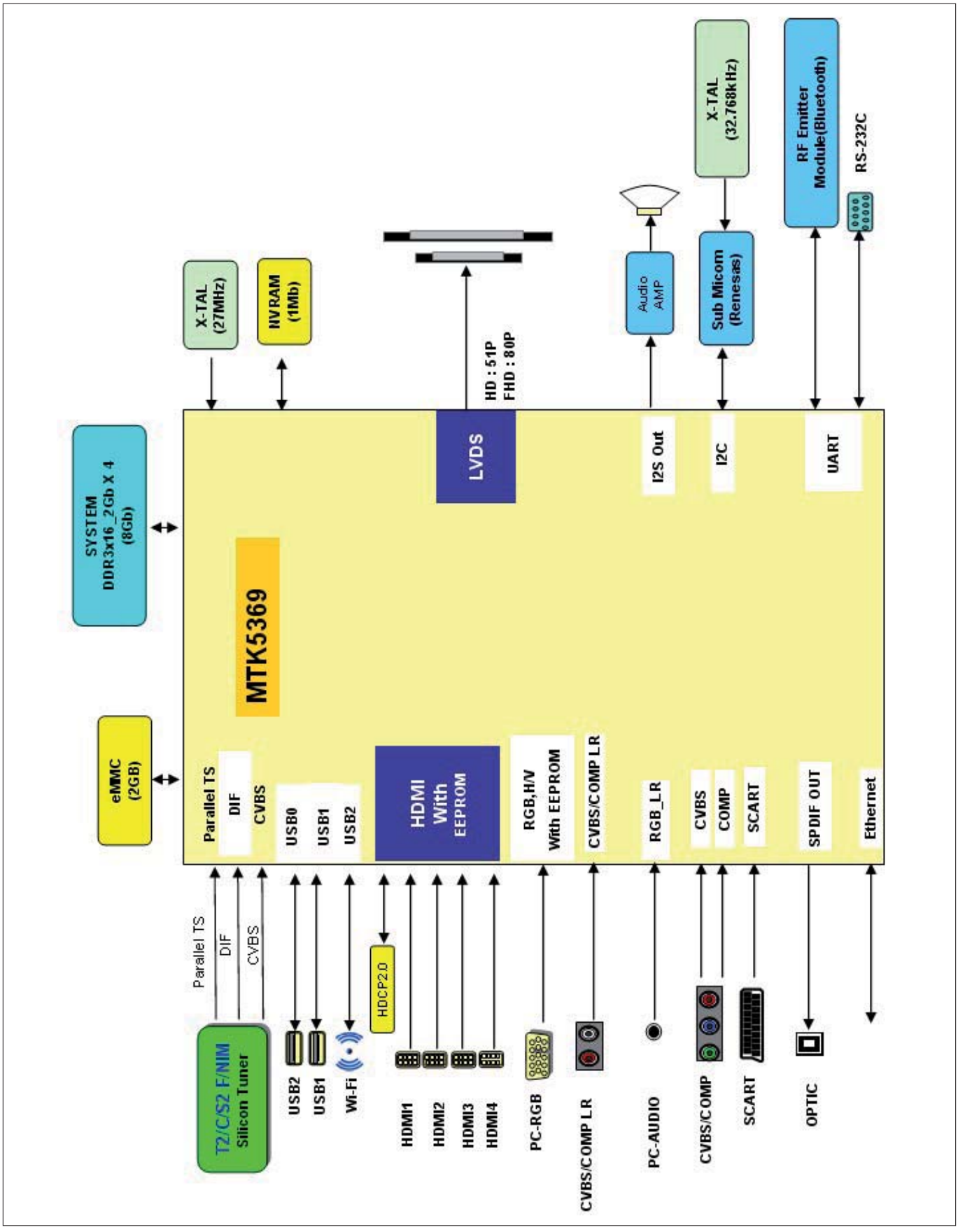
BLOCK DIAGRAM



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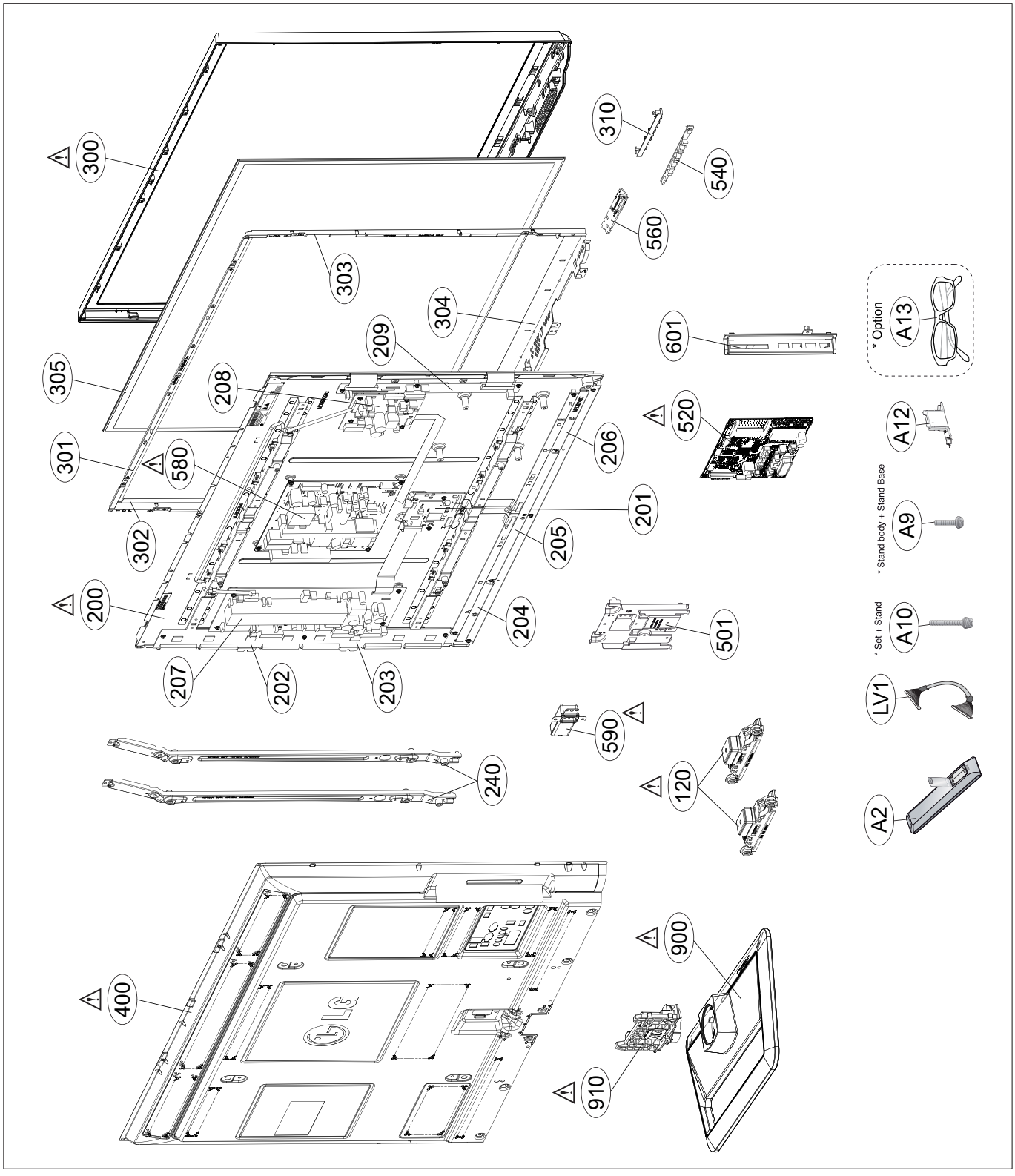
EXPLODED VIEW

IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by ⚠ in the Schematic Diagram and EXPLODED VIEW.
It is essential that these special safety parts should be replaced with the same components as recommended in this manual to prevent X-RADIATION, Shock, Fire, or other Hazards.
Do not modify the original design without permission of manufacturer.



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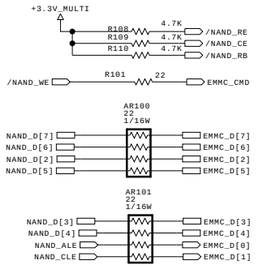
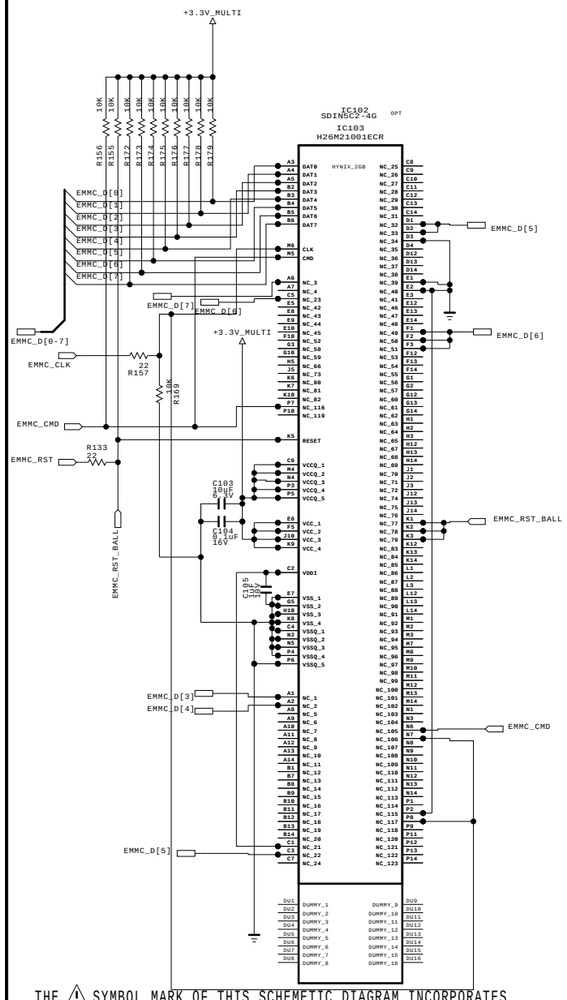
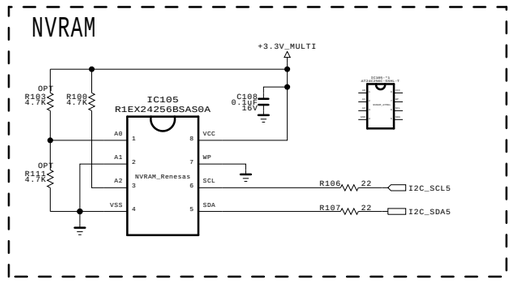
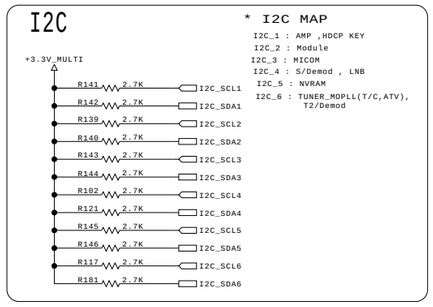
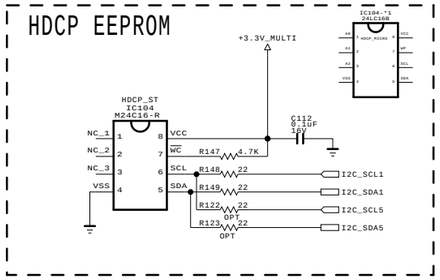
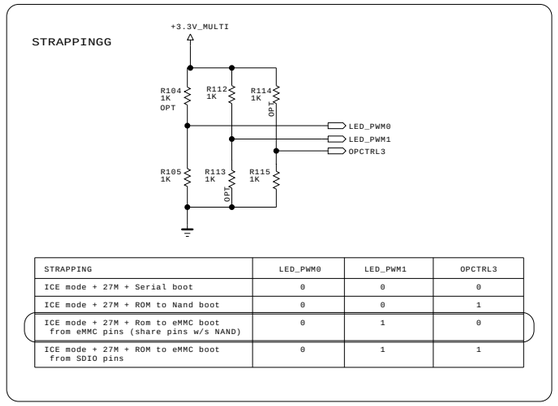




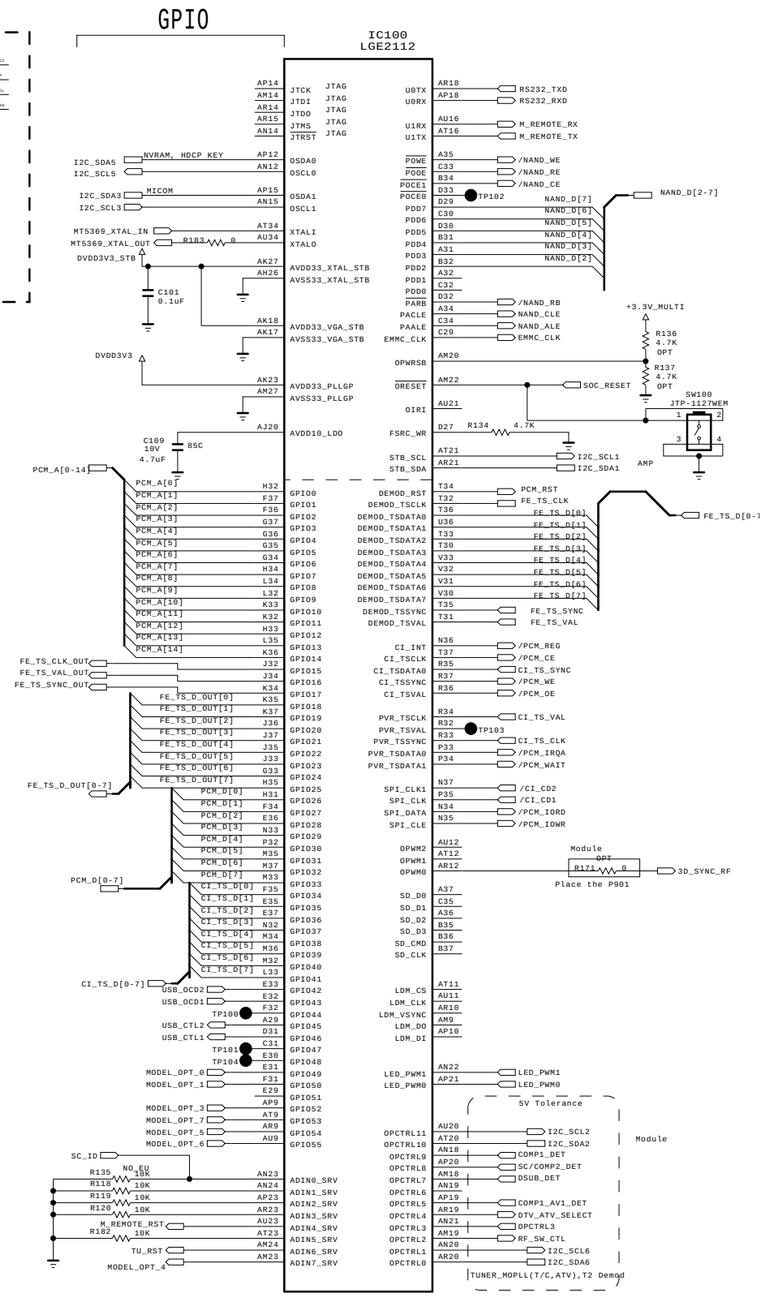


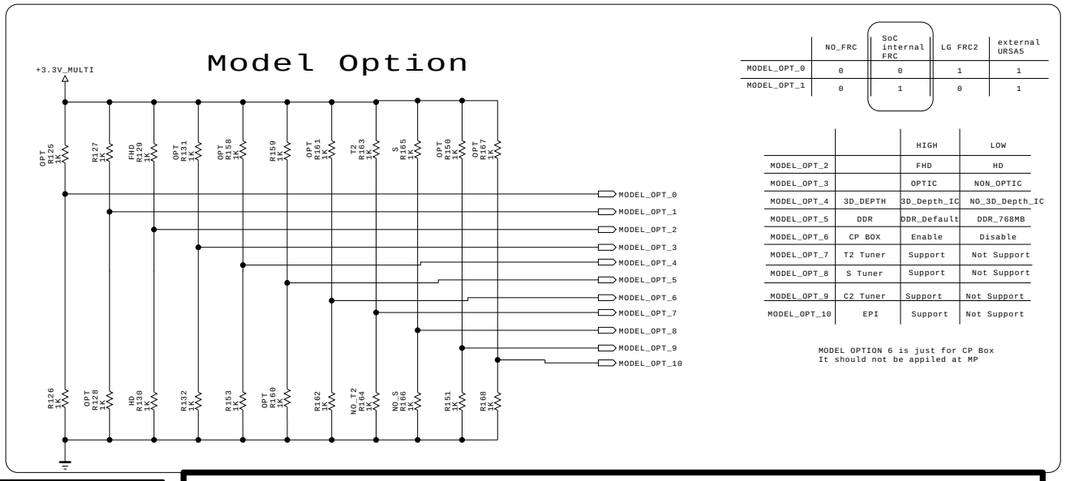






STRAPPING	LED_PWM0	LED_PWM1	OPCTRL3
ICE mode + 27M + Serial boot	0	0	0
ICE mode + 27M + ROM to Nand boot	0	0	1
ICE mode + 27M + Rom to eMMC boot from eMMC pins (share pins w/s NAND)	0	1	0
ICE mode + 27M + ROM to eMMC boot from SDIO pins	0	1	1

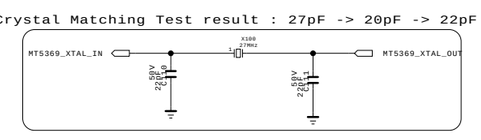


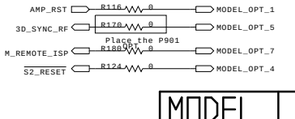


	NO_FRC	SoC internal FRC	LG FRC2	external URSA5
MODEL_OPT_0	0	0	1	1
MODEL_OPT_1	0	1	0	1

		HIGH	LOW
MODEL_OPT_2		FHD	HD
MODEL_OPT_3		OPTIC	NON_OPTIC
MODEL_OPT_4	3D_DEPTH	3D_Depth_IC	NO_3D_Depth_IC
MODEL_OPT_5	DDR	DDR_Default	DDR_768MB
MODEL_OPT_6	CP BOX	Enable	Disable
MODEL_OPT_7	T2 Tuner	Support	Not Support
MODEL_OPT_8	S Tuner	Support	Not Support
MODEL_OPT_9	C2 Tuner	Support	Not Support
MODEL_OPT_10	EPI	Support	Not Support

MODEL OPTION 6 is just for CP Box
It should not be appiled at MP





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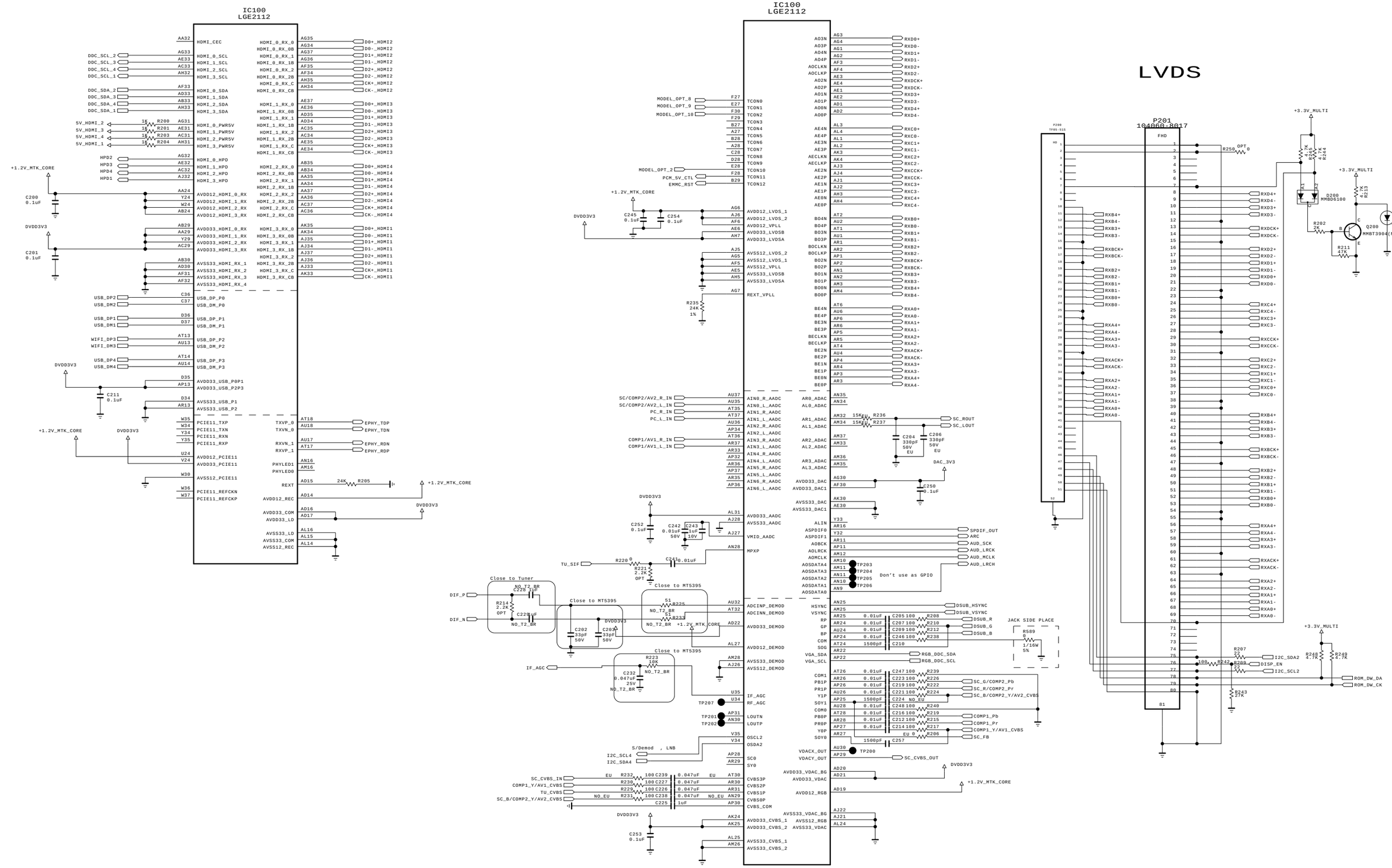

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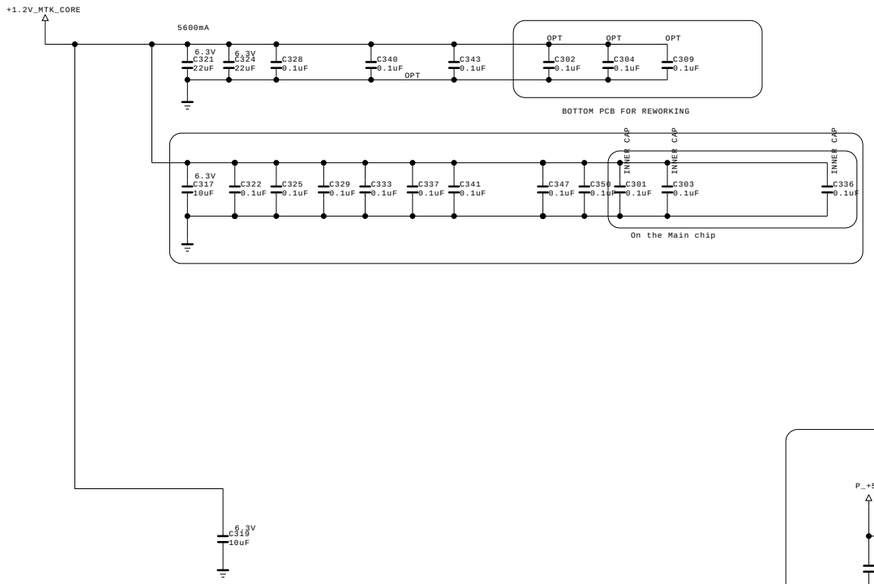
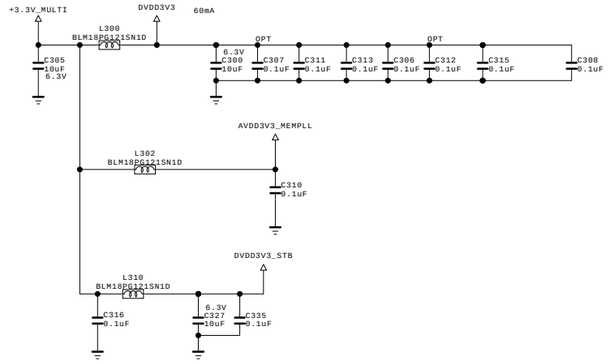
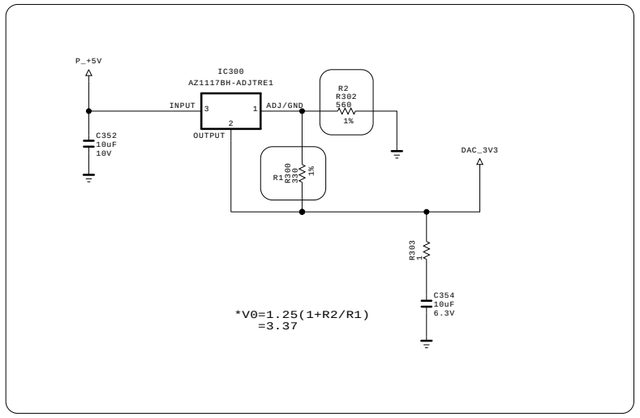
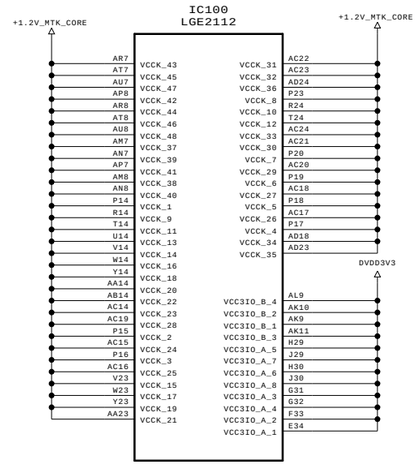
CORE 1.2V : 6100mA

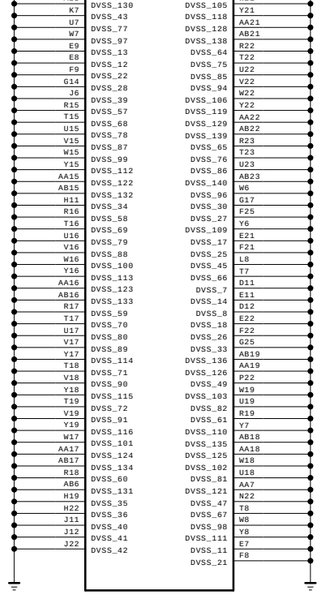


MULTI 3.3V : XXXXmA






IC100
LGE2112
+1.2V_MTK_CORE
+1.2V_MTK_CORE
DVDD3V3
AR7 AT7 AU7 AP8 AR8 AT8 AU8 AM7 AN7 AP7 AM8 AN8 P14 R14 T14 U14 V14 W14 Y14 AA14 AB14 AC14 AC19 P15 AC15 P16 AC16 V23 W23 Y23 AA23
VCCK_43 VCCK_45 VCCK_47 VCCK_42 VCCK_44 VCCK_46 VCCK_48 VCCK_37 VCCK_39 VCCK_41 VCCK_38 VCCK_40 VCCK_1 VCCK_9 VCCK_11 VCCK_13 VCCK_14 VCCK_16 VCCK_18 VCCK_20 VCCK_22 VCCK_23 VCCK_28 VCCK_2 VCCK_24 VCCK_3 VCCK_25 VCCK_15 VCCK_17 VCCK_19 VCCK_21
VCCK_31 VCCK_32 VCCK_36 VCCK_8 VCCK_10 VCCK_12 VCCK_33 VCCK_30 VCCK_7 VCCK_29 VCCK_6 VCCK_27 VCCK_5 VCCK_26 VCCK_4 VCCK_34 VCCK_35
VCC3IO_B_4 VCC3IO_B_2 VCC3IO_B_1 VCC3IO_B_3 VCC3IO_A_5 VCC3IO_A_7 VCC3IO_A_6 VCC3IO_A_8 VCC3IO_A_3 VCC3IO_A_4 VCC3IO_A_2 VCC3IO_A_1
AC22 AC23 AD24 P23 R24 T24 AC24 AC21 P20 AC20 P19 AC18 P18 AC17 P17 AD18 AD23
AL9 AK10 AK9 AK11 H29 J29 H30 J30 G31 G32 F33 E34


IC100
LGE2112
R2 R3 J4 R4 Y4 F5 J5 R5 Y5 W5 L7 M7 R7 AA5 AB5 K7 U7 W7 E9 E8 F9 G14 J6 R15 T15 U15 V15 W15 Y15 AA15 AB15 H11 R16 T16 U16 V16 W16 Y16 AA16 AB16 R17 T17 U17 V17 Y17 T18 V18 Y18 T19 V19 Y19 W17 AA17 AB17 R18 AB6 H19 H22 J11 J12 J22
DVSS_51 DVSS_52 DVSS_37 DVSS_53 DVSS_107 DVSS_20 DVSS_38 DVSS_54 DVSS_108 DVSS_95 DVSS_44 DVSS_46 DVSS_56 DVSS_120 DVSS_130 DVSS_43 DVSS_77 DVSS_97 DVSS_13 DVSS_12 DVSS_22 DVSS_28 DVSS_39 DVSS_57 DVSS_68 DVSS_78 DVSS_87 DVSS_99 DVSS_112 DVSS_122 DVSS_132 DVSS_34 DVSS_58 DVSS_69 DVSS_79 DVSS_88 DVSS_100 DVSS_113 DVSS_123 DVSS_133 DVSS_59 DVSS_70 DVSS_80 DVSS_89 DVSS_114 DVSS_71 DVSS_90 DVSS_115 DVSS_72 DVSS_91 DVSS_116 DVSS_101 DVSS_124 DVSS_134 DVSS_60 DVSS_131 DVSS_35 DVSS_36 DVSS_40 DVSS_41 DVSS_42
DVSS_55 DVSS_62 DVSS_73 DVSS_83 DVSS_92 DVSS_104 DVSS_117 DVSS_127 DVSS_137 DVSS_29 DVSS_63 DVSS_74 DVSS_84 DVSS_93 DVSS_105 DVSS_118 DVSS_128 DVSS_138 DVSS_64 DVSS_75 DVSS_85 DVSS_94 DVSS_106 DVSS_119 DVSS_129 DVSS_139 DVSS_65 DVSS_76 DVSS_86 DVSS_140 DVSS_96 DVSS_30 DVSS_27 DVSS_109 DVSS_17 DVSS_25 DVSS_45 DVSS_66 DVSS_7 DVSS_14 DVSS_8 DVSS_18 DVSS_26 DVSS_33 DVSS_136 DVSS_126 DVSS_49 DVSS_103 DVSS_82 DVSS_61 DVSS_110 DVSS_135 DVSS_125 DVSS_102 DVSS_81 DVSS_121 DVSS_47 DVSS_67 DVSS_98 DVSS_111 DVSS_11 DVSS_21
R6 R20 T20 U20 V20 W20 Y20 AA20 AB20 G16 R21 T21 U21 V21 W21 Y21 AA21 AB21 R22 T22 U22 V22 W22 Y22 AA22 AB22 R23 T23 U23 AB23 W6 G17 F25 Y6 E21 F21 L8 T7 D11 E11 D12 E22 F22 G25 AB19 AA19 P22 W19 U19 R19 Y7 AB18 AA18 W18 U18 AA7 N22 T8 W8 Y8 E7 F8

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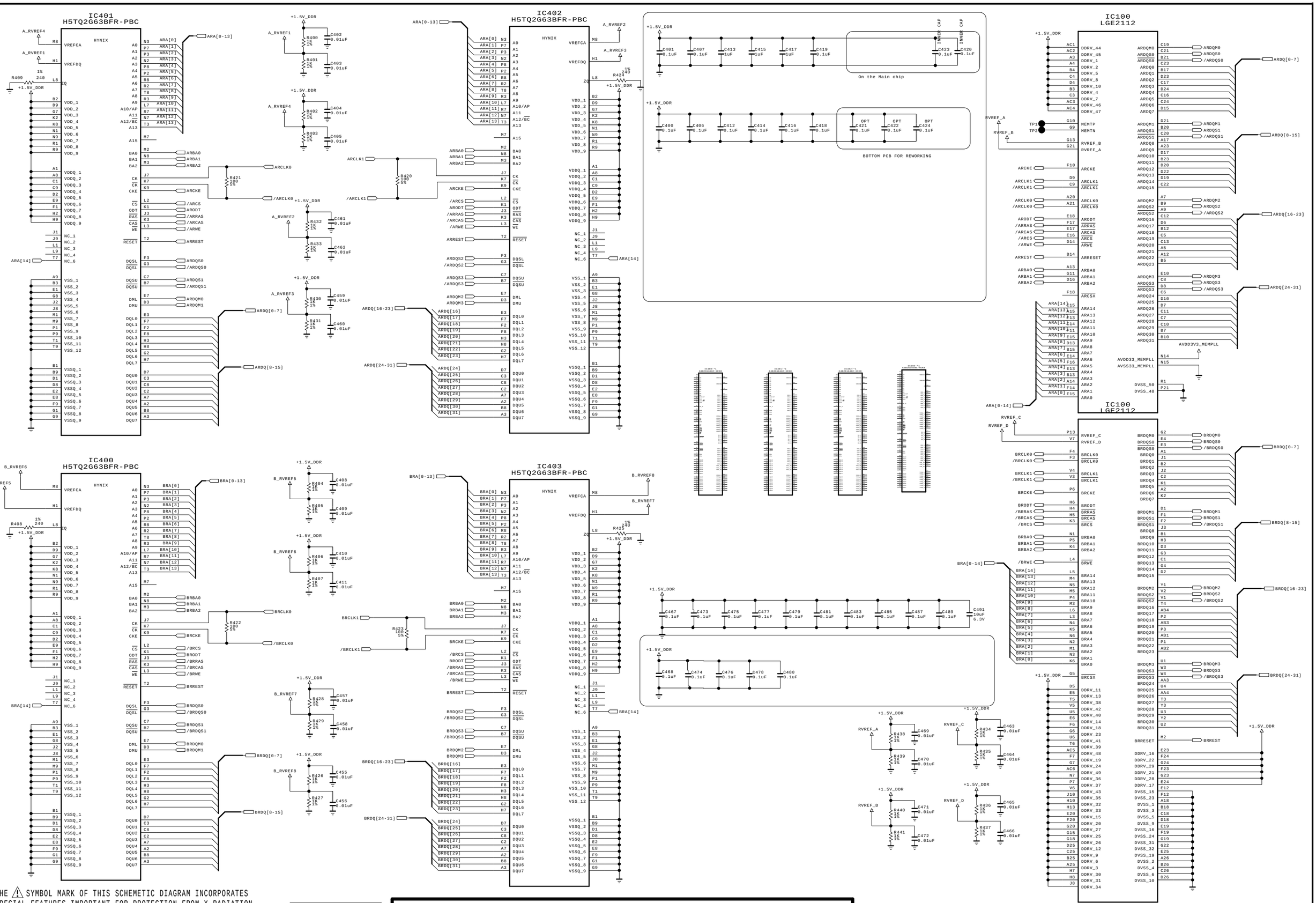

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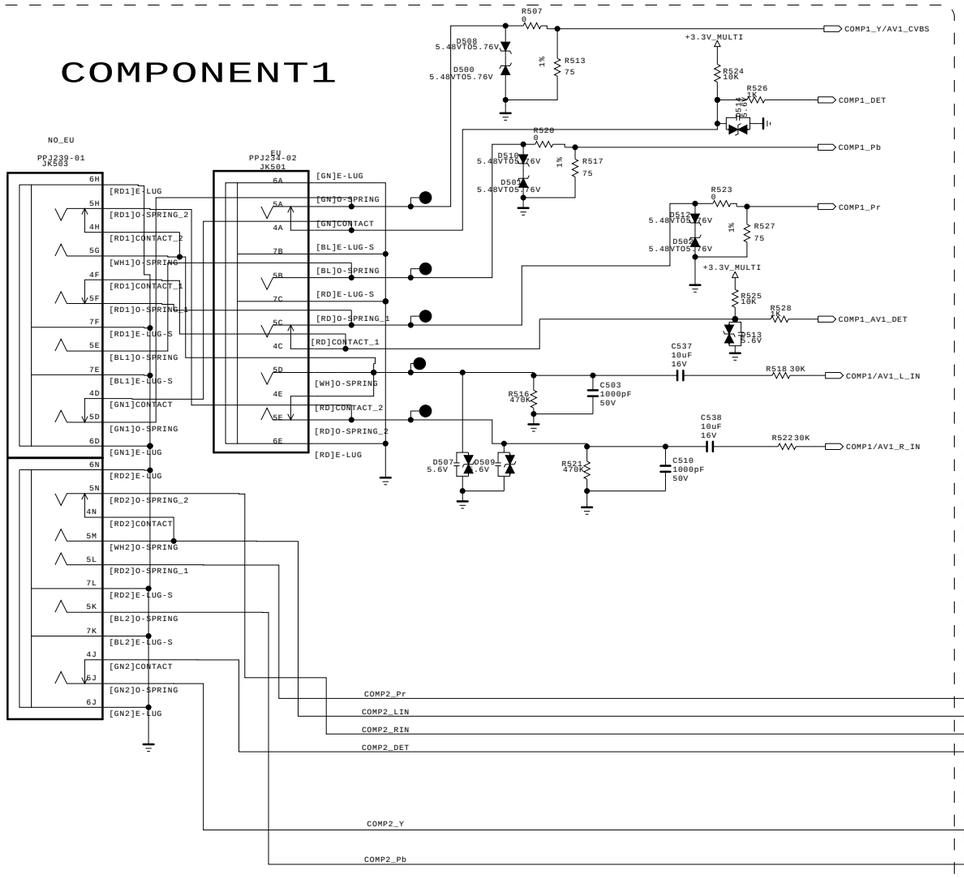
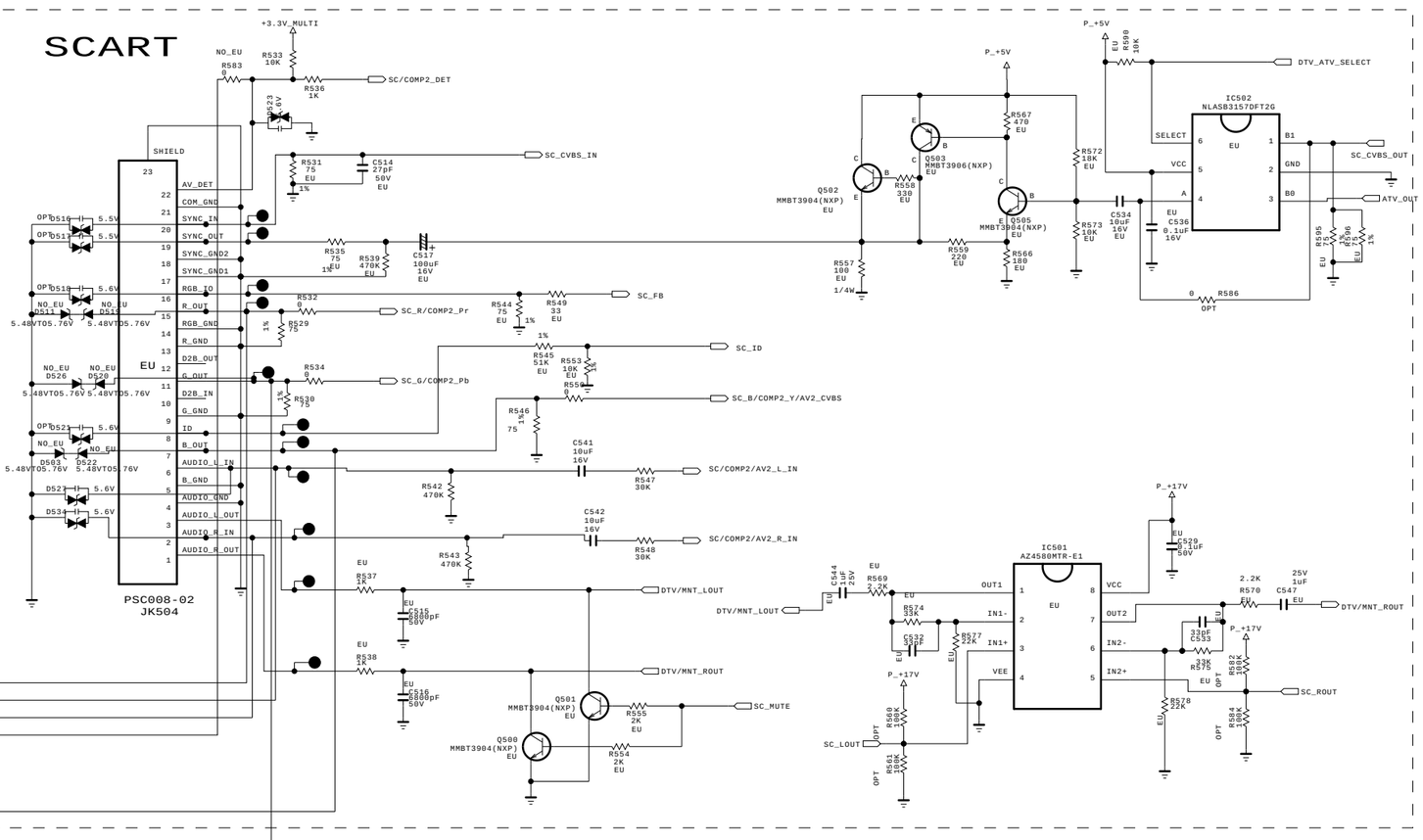
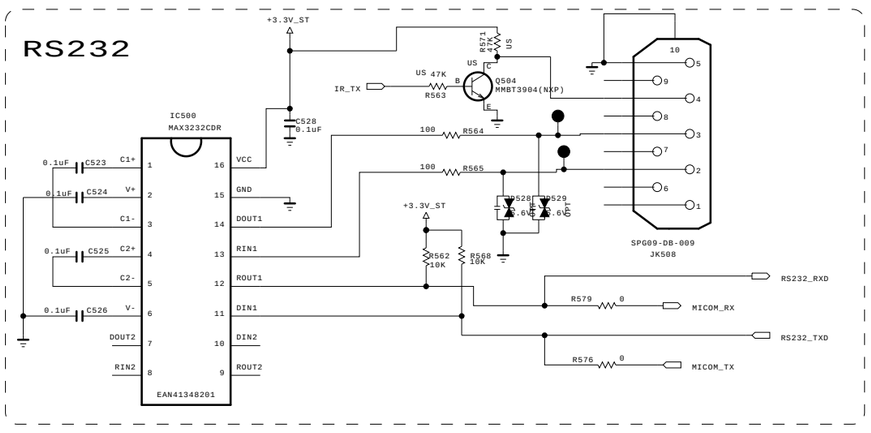
COMPONENT1

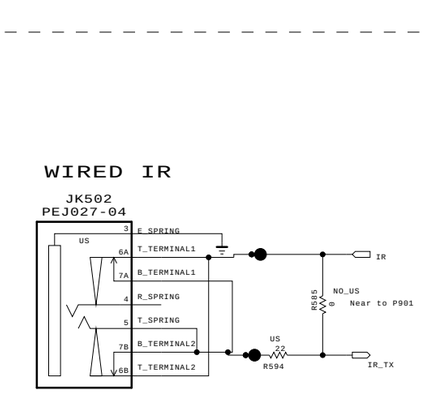


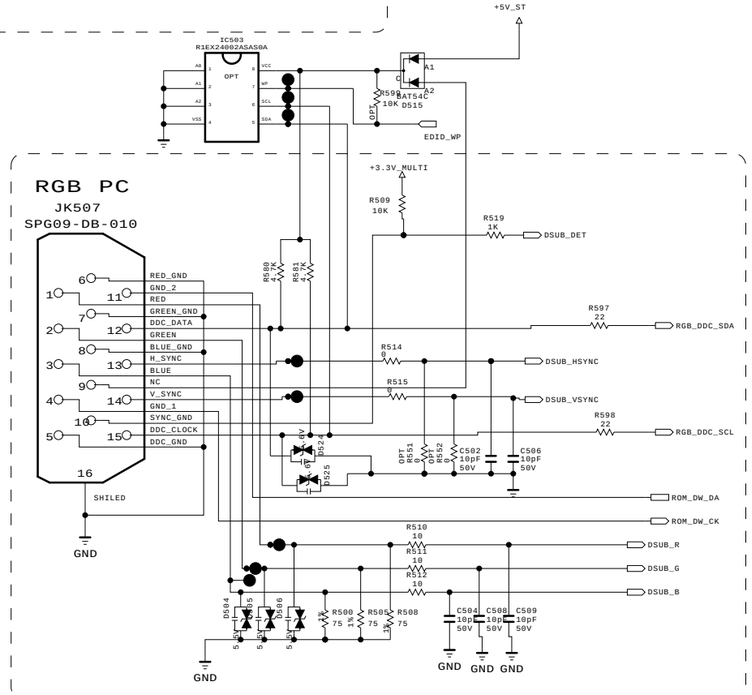
COMPONENT2

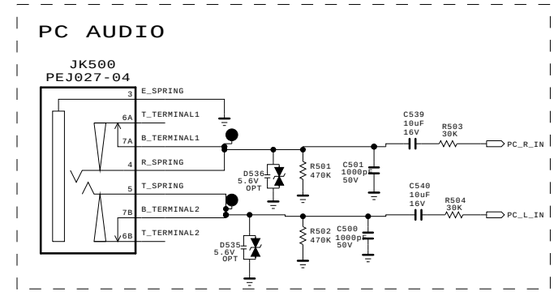
SCART

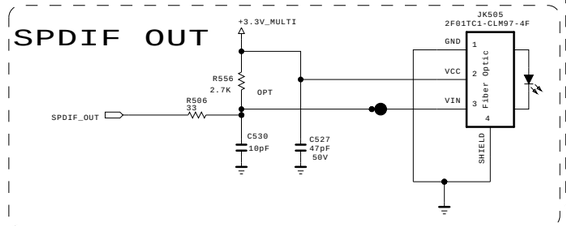


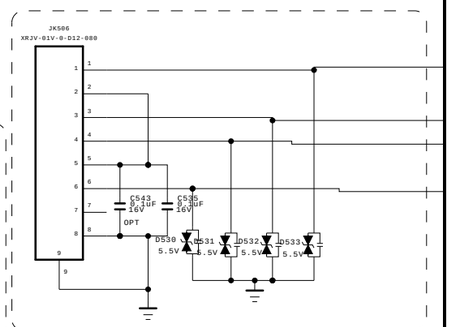












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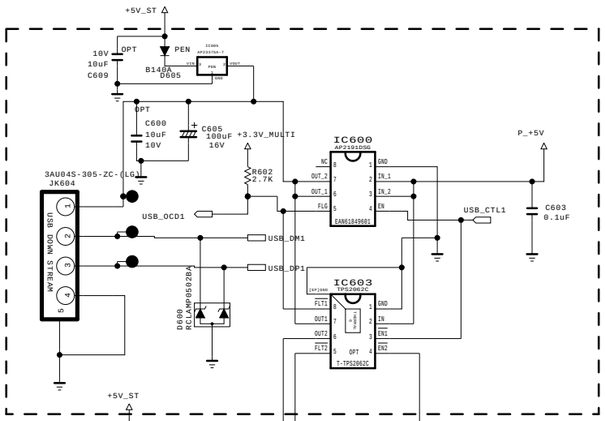
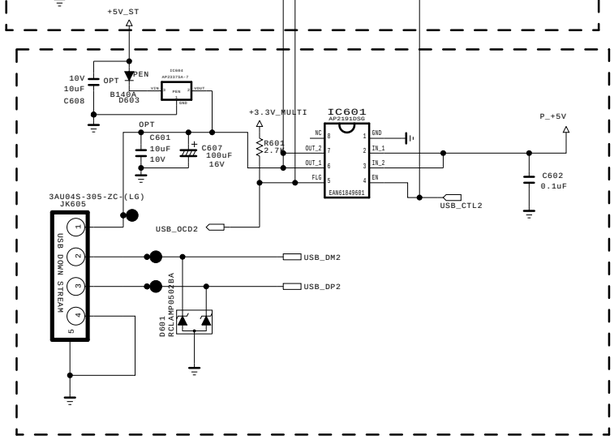
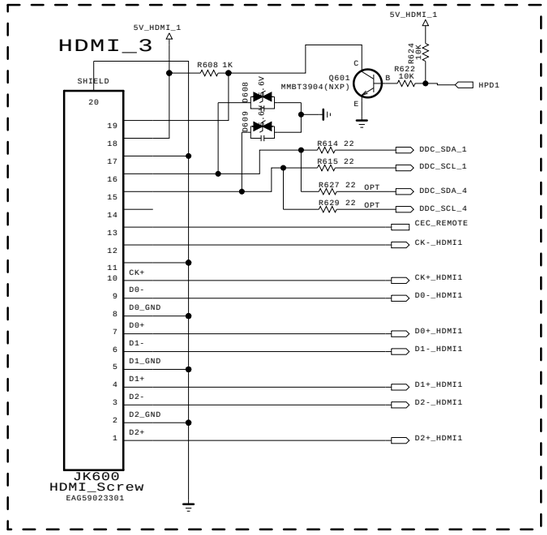
USB1



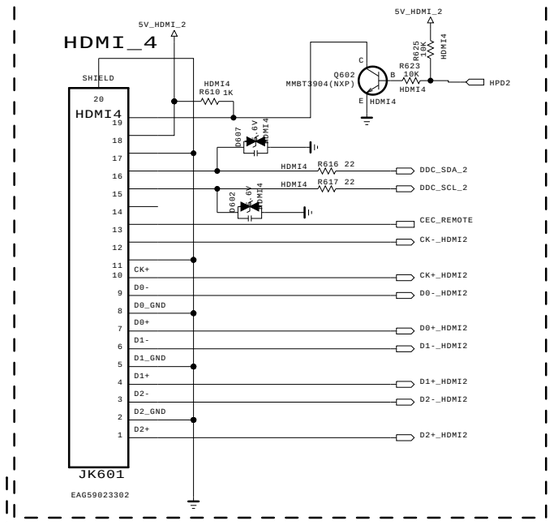
USB2



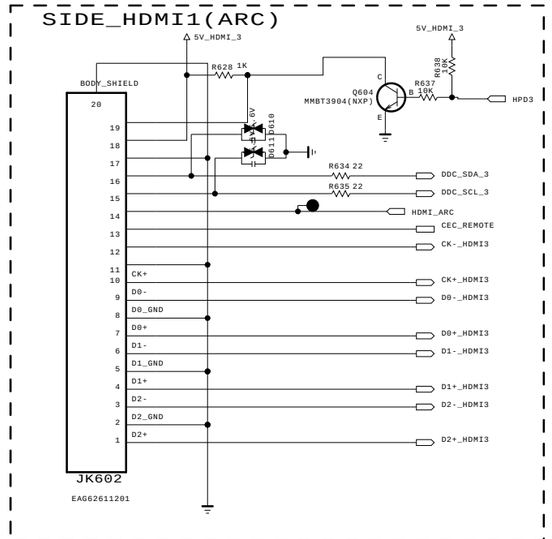
HDMI_3



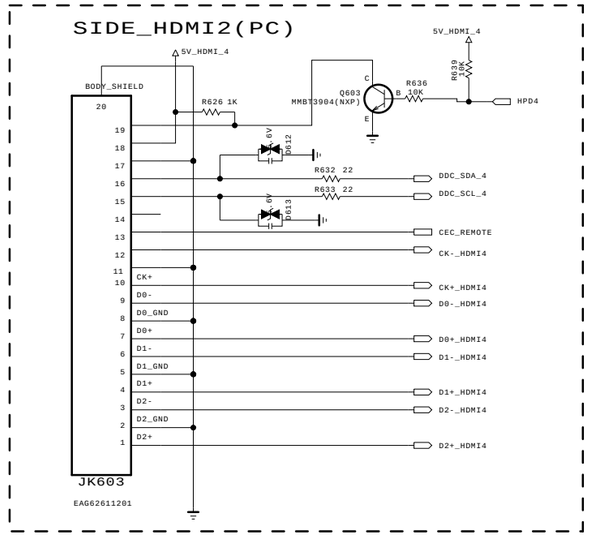
HDMI_4



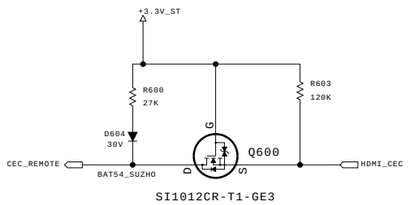
SIDE_HDMI1(ARC)



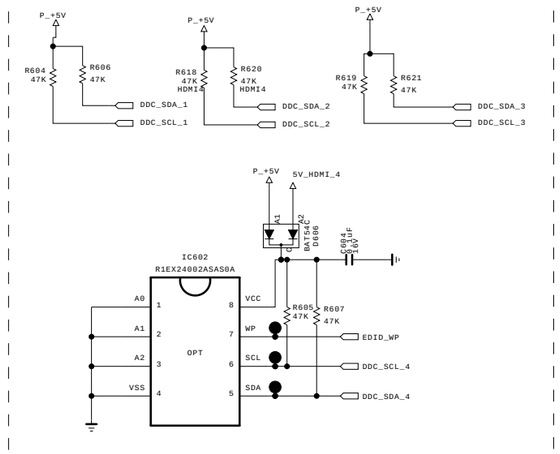
SIDE_HDMI2(PC)

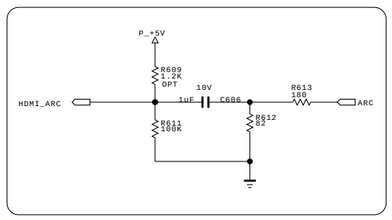


* HDMI CEC



EDID Pull-up





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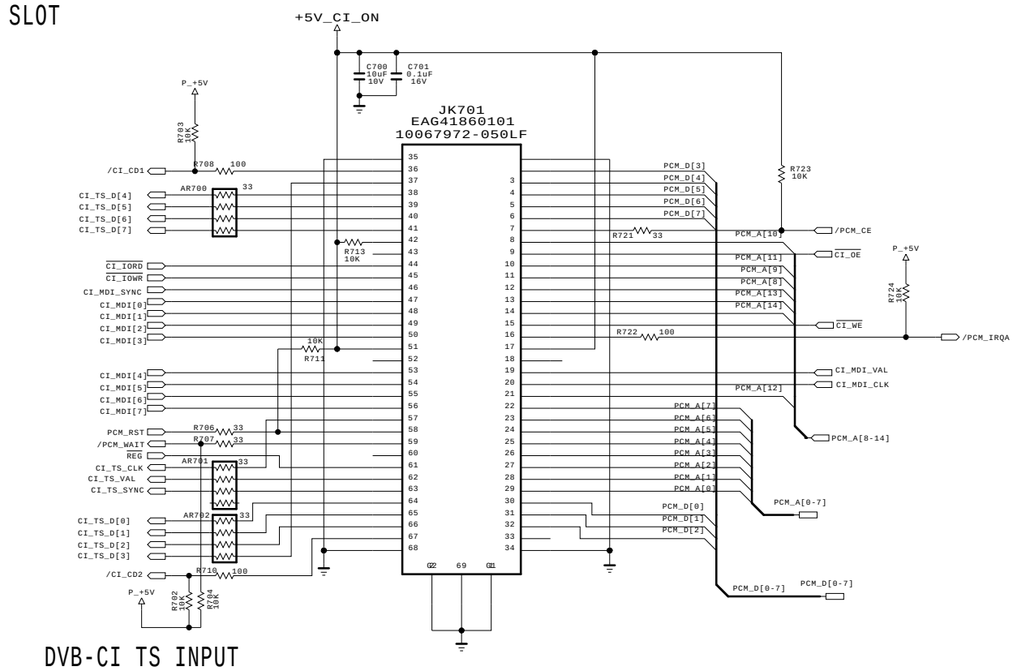
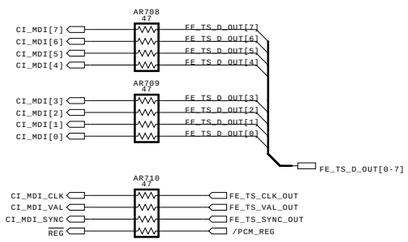
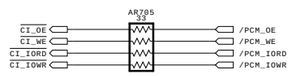
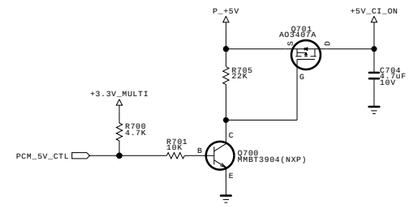


DVB-CI TS INPUT

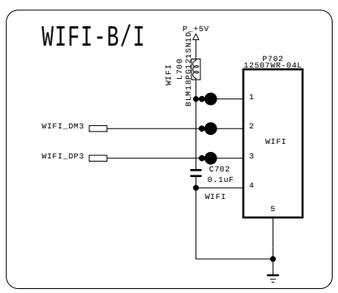




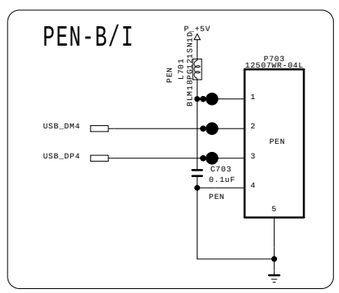
CI POWER ENABLE CONTROL



WIFI-B/I



PEN-B/I



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PCMCI Slot/WIFI/PEN

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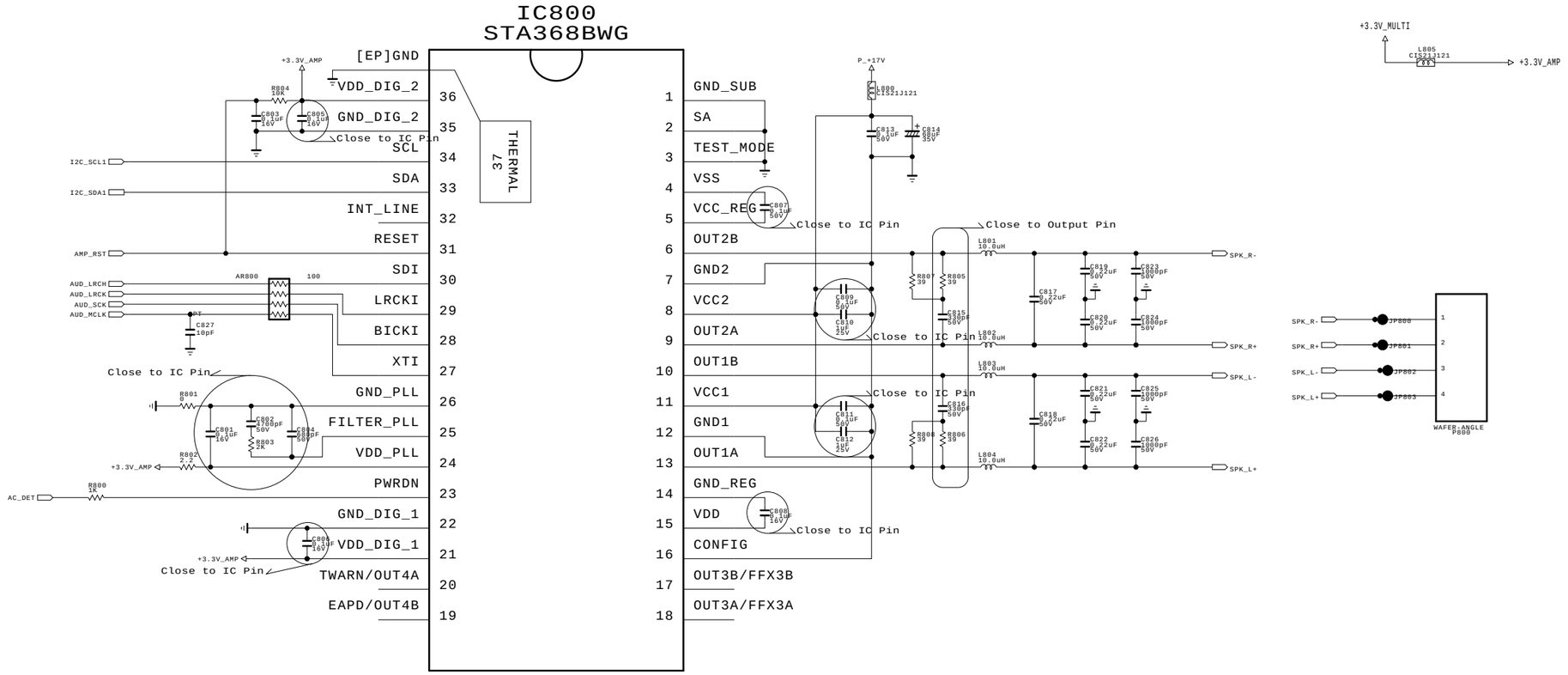
AUDIO AMP [STA368BW]



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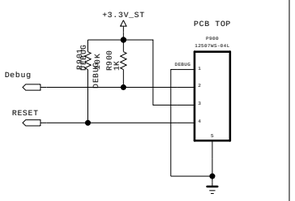
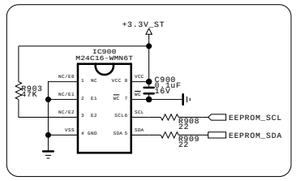
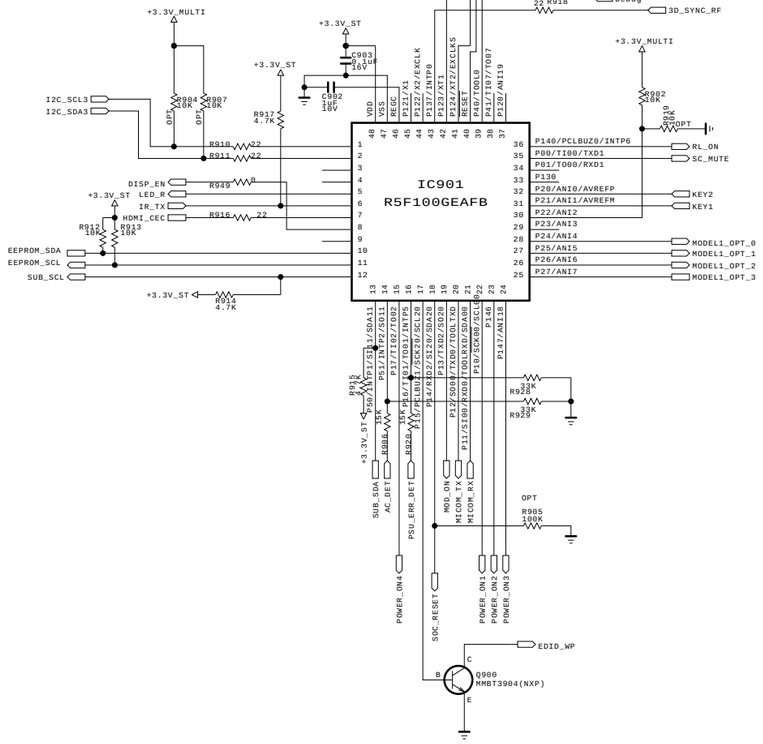
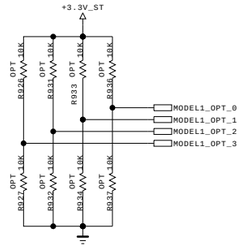






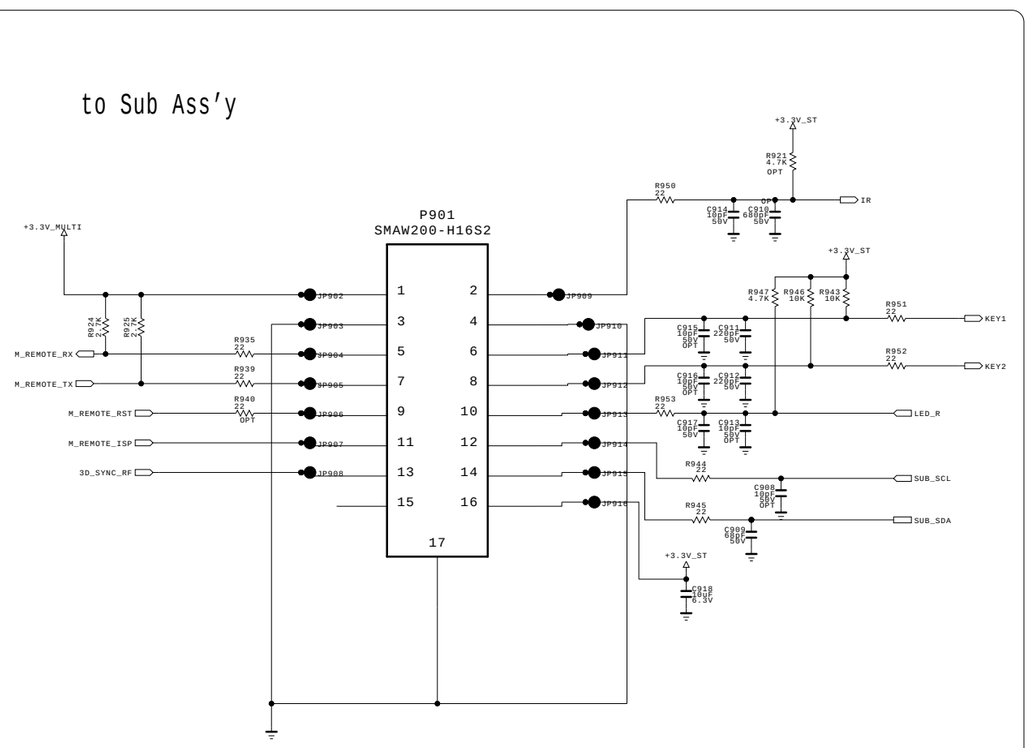
MICOM MODEL OPTION



**ALL TOOL : LED_RED

PIN NAME	PIN NO.	HIGH	LOW
MODEL1_OPT_0	8	ATSC	DVB
MODEL1_OPT_1	11	PZ55	PZ75/PZ95
MODEL1_OPT_2	30	PZ95	PZ55/PZ75
MODEL1_OPT_3	31	-	-

to Sub Ass'y



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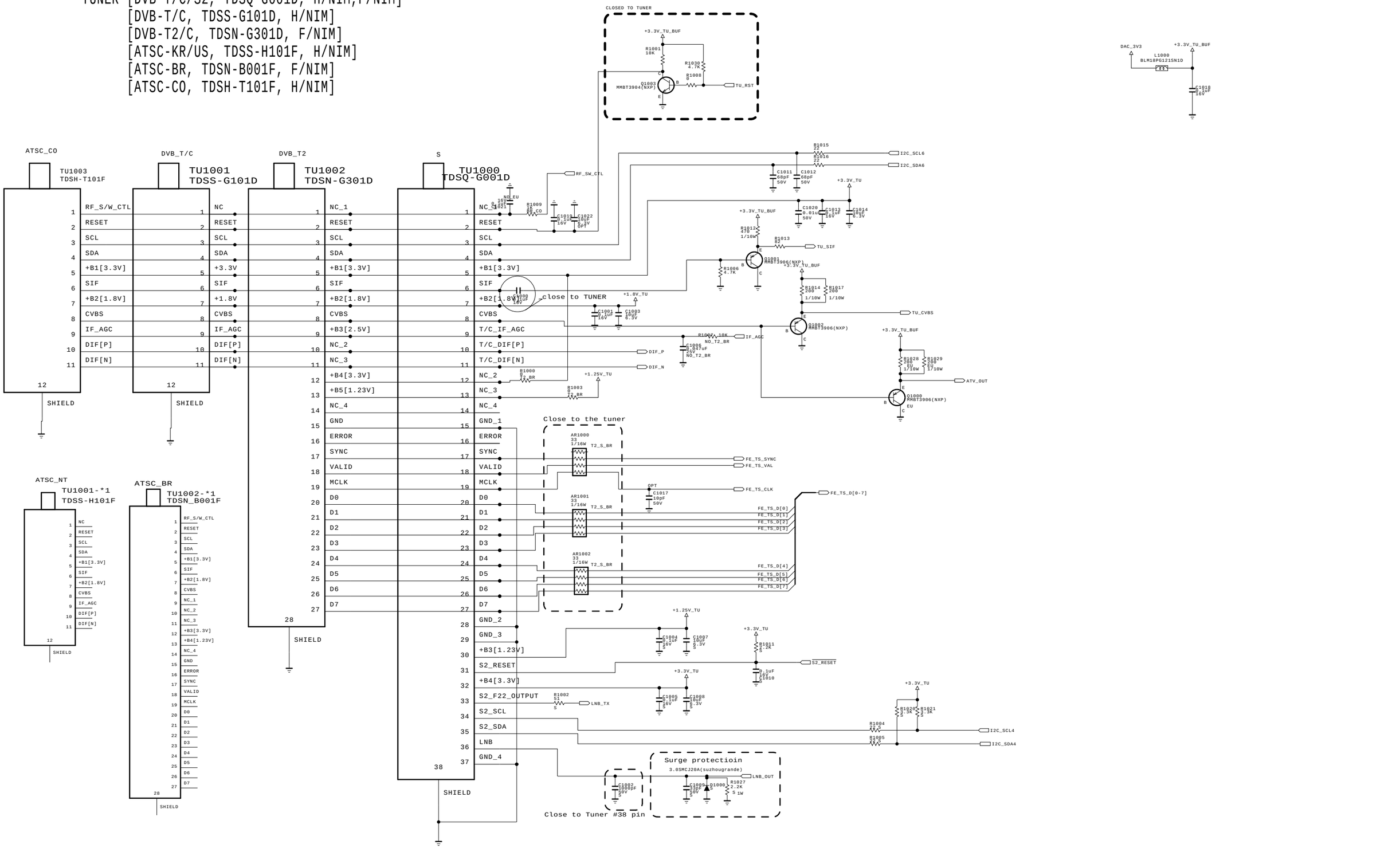
TUNER [DVB-T/C/S2, TDSQ-G001D, H/NIM,F/NIM]
[DVB-T/C, TDSS-G101D, H/NIM]
[DVB-T2/C, TDSN-G301D, F/NIM]
[ATSC-KR/US, TDSS-H101F, H/NIM]
[ATSC-BR, TDSN-B001F, F/NIM]
[ATSC-CO, TDSH-T101F, H/NIM]



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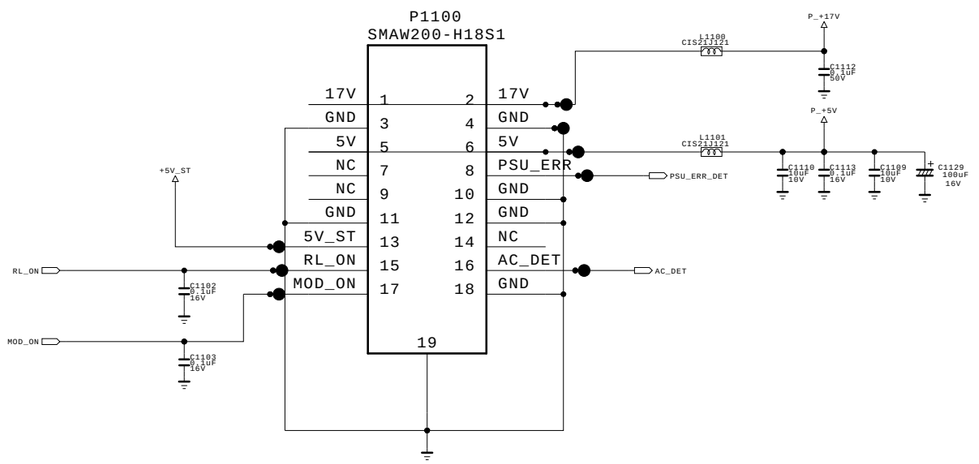
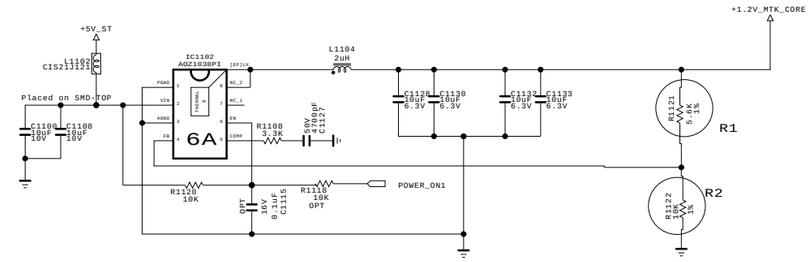
fr. PWR SUPPLY UNIT

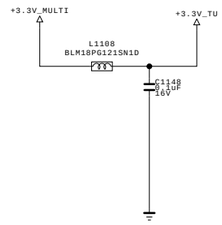


+1.2V_CORE_MT5369

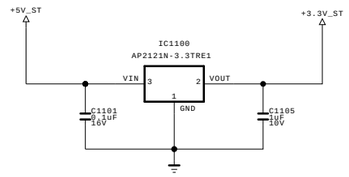


Switching freq: 555K

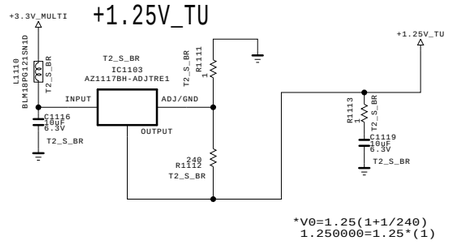
Vout=Vref*(1+R1/R2)|Vref=0.8



+3.3V_Stand_By

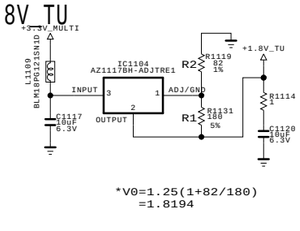


+1.25V_TU

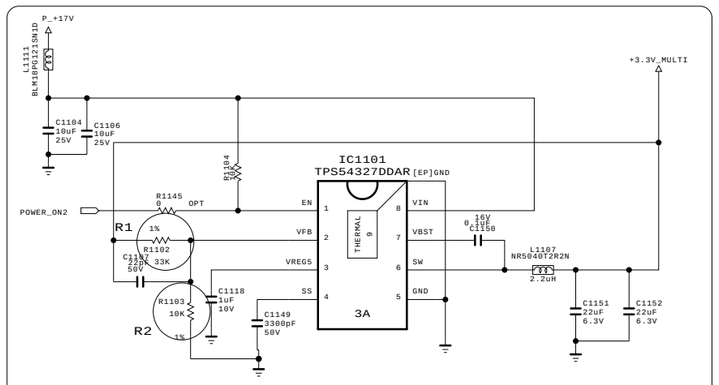


*V0=1.25(1+1/240)
1.250000=1.25*(1)

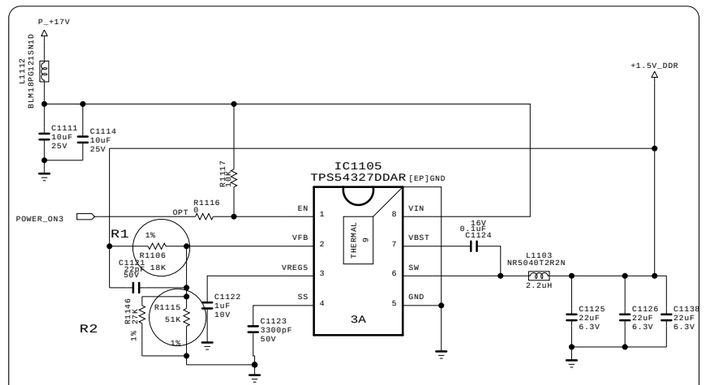
+1.8V_TU



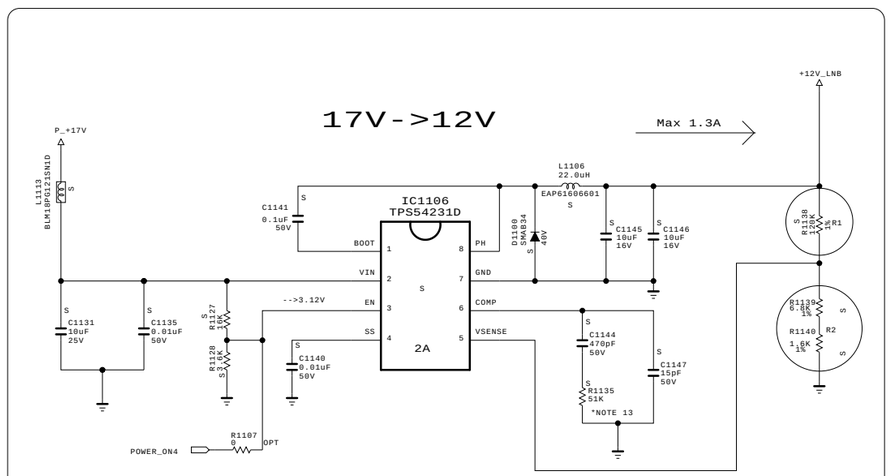
*V0=1.25(1+82/180)
=1.8194



Vout=0.765*(1+R1/R2)



Vout=0.765*(1+R1/R2)



Vout=0.8*(1+R1/R2)

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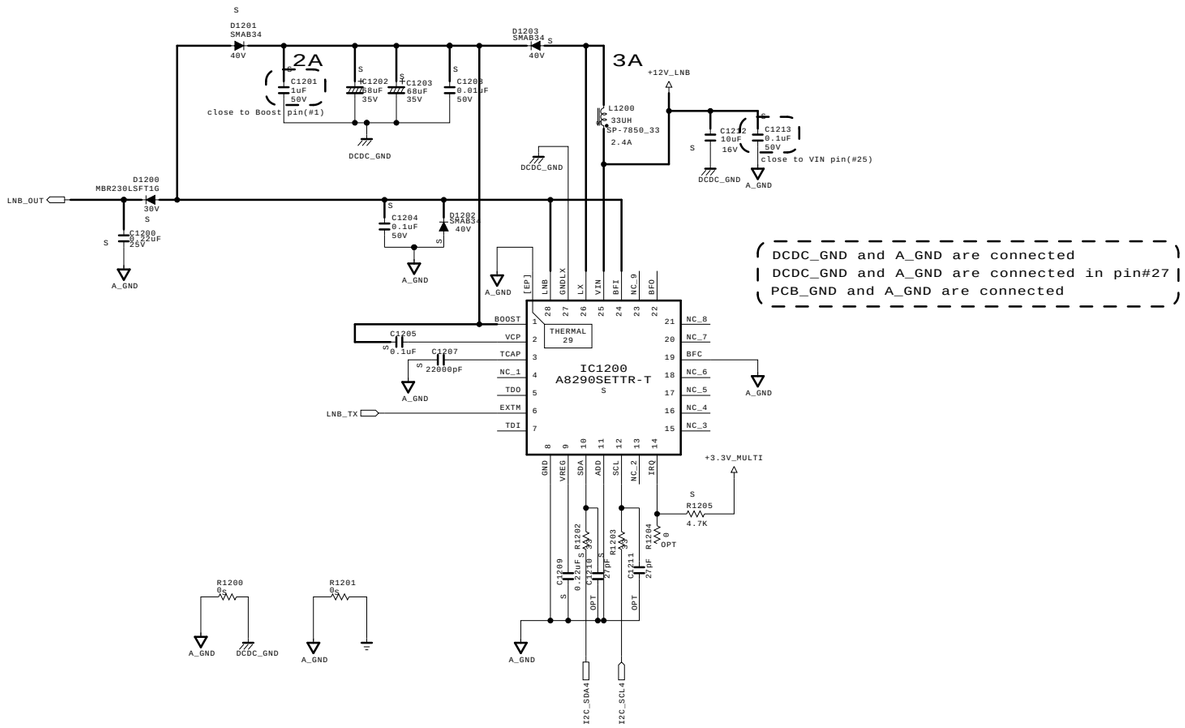
DVB-S2 LNB Part_Allegro



DCDC_GND and A_GND are connected
DCDC_GND and A_GND are connected in pin#27
PCB_GND and A_GND are connected

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LG
Life's Good

Training manual
(PD22A)

Contents

1. System Design

2. Trouble Shooting Guide

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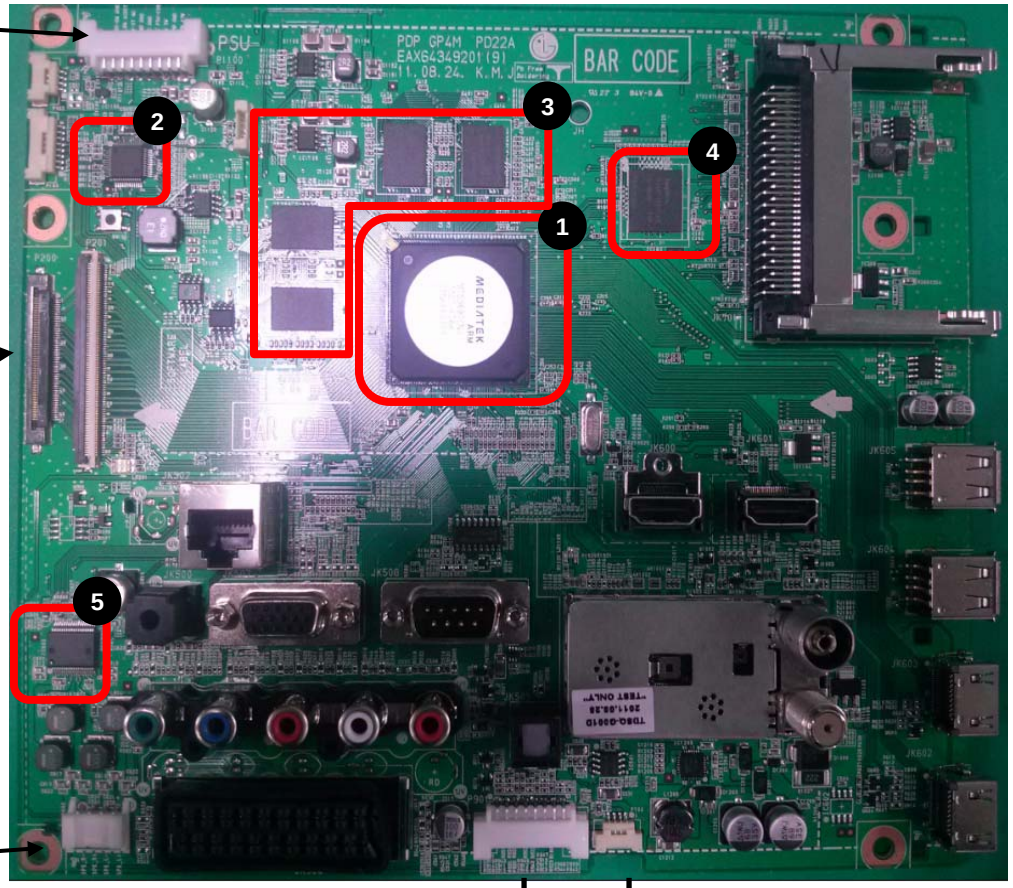
Main Board for GP4 PDP



1. Main processor
2. Micom
3. DDR3
4. EMMC
5. Audio Amp

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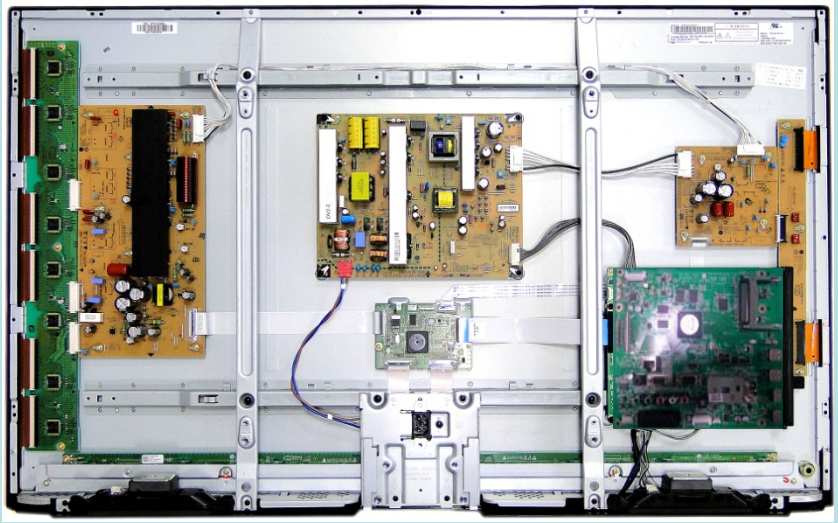
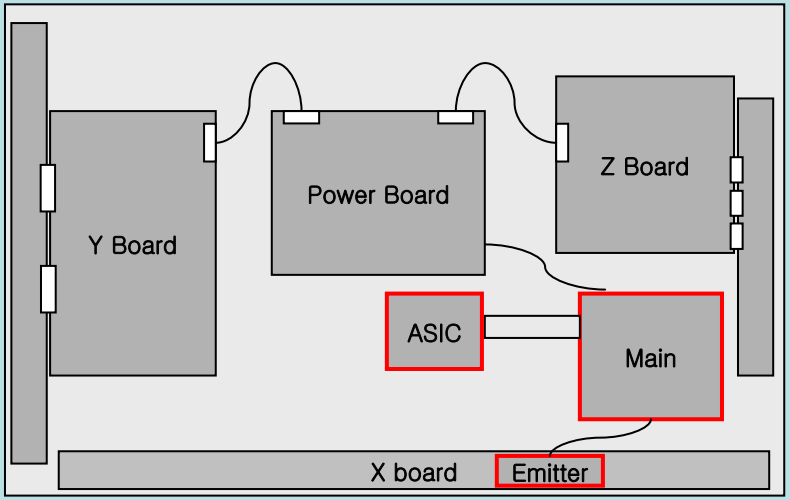
Set layout

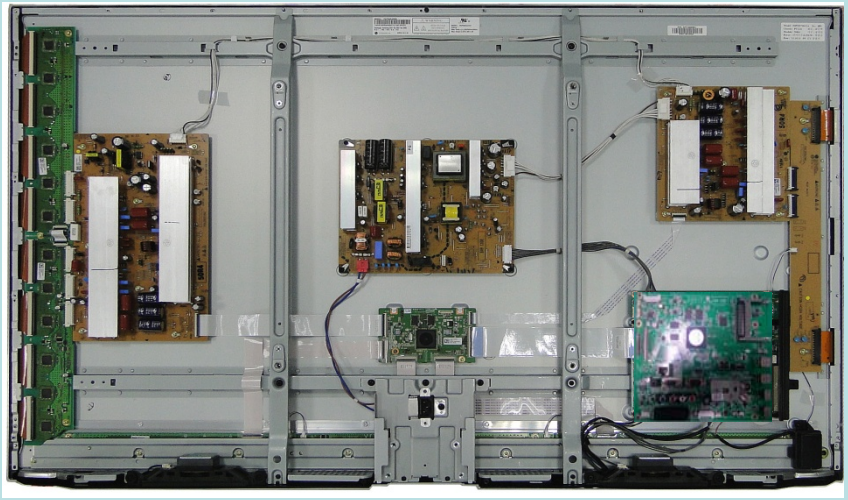
42PM470S-ZA Model Image



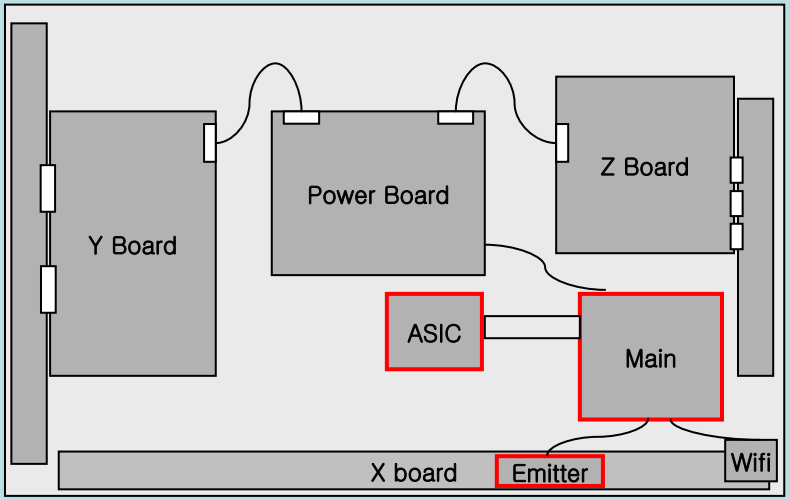
42PM470S-ZA Model block diagram



50PM970S-ZA Model Image



50PM970S-ZA Model block diagram



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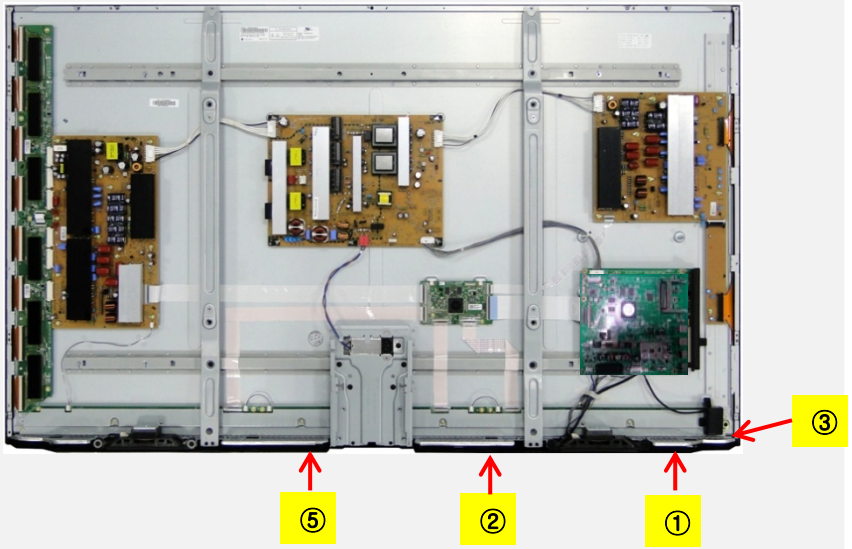
Sub Ass’y

구분	2012 (GP4)		feature
IR	common		■ tact key type ■ assembly with screw in cabinet ■ no jig needed ■ bracket assembly work needed
3D Emitter Motion R/C	common		■ bluetooth type
WIFI	EU/CIS : PM970,PM690,PM680 Asia : PM970,PM690 PM680,PM670		■ built in WiFi dongle ■ no dongle assessory
	other models	function ready	
Pen	PM690 (Pen Touch Model)		■ built in pen dongle

	2012 (GP4)
Set	
IR	
3D Emitter	
WiFi Dongle	
Pen Dongle	

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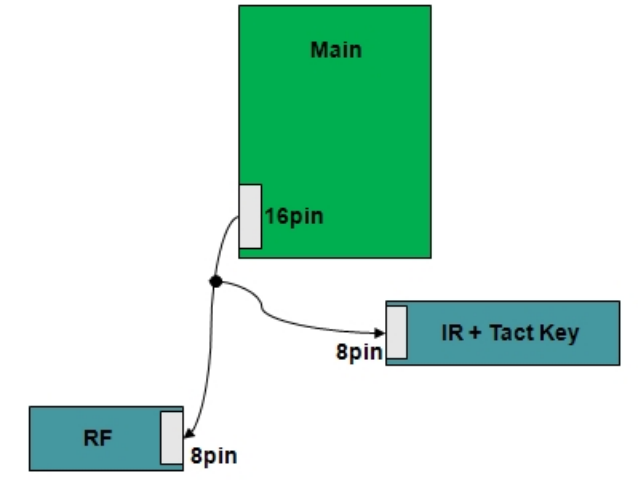
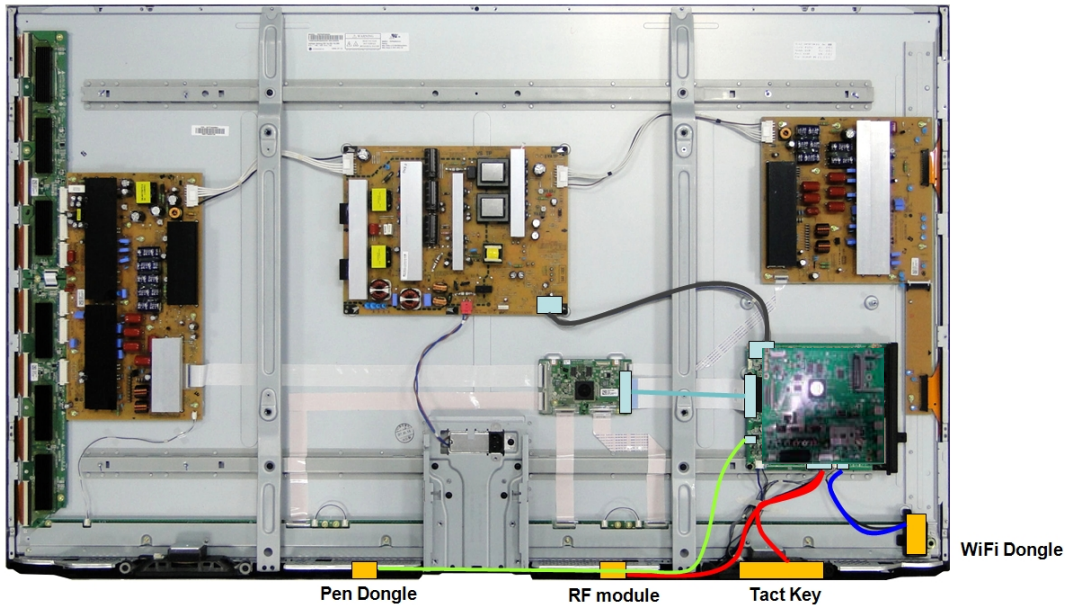
IR & RF Cables

	2012 GP4
Sub Ass'y & Cables	
Pin Map	**IR** 1 IR 2 GND 3 KEY1 4 KEY2 5 LED_R 6 SCL 7 SDA 8 3.3V_ST **RF** 1 +3.3V 2 GND 3 RX 4 TX 5 RST 6 ISP 7 3D_SYNC



2012 GP4 Cable Arrangement

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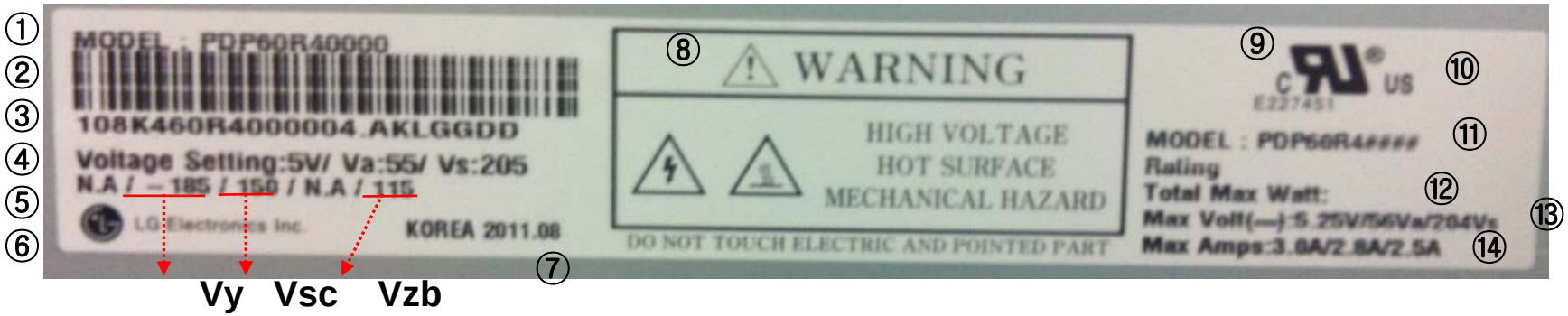
PDP Module Label Information



① Model Name

② Bar Code
(Code 128, Contains the manugacture No.)

③ Manugacture No.

④ Adjusting Voltage(DC Va, Vs)

⑤ Adjusting Voltage (Set up/-Vy/Vsc/Ve/Vzb)

⑥ The trade name of LG Electronics

⑦ Manufactured date(Year & Month)

⑧ Warning

⑨ UL Approval Mark

⑩ UL Approval No.

⑪ Model Name

⑫ Max. Watt

⑬ Max. Volts

⑭ Max. Amps

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MTK GPIO PIN MAP – MTK Reference B/D

GPIO LIST

PIN NAME	GPIO Function	Function define
GPIO_0	CI Interface	CI_A0
GPIO_1	CI Interface	CI_A1
GPIO_2	CI Interface	CI_A2
GPIO_3	CI Interface	CI_A3
GPIO_4	CI Interface	CI_A4
GPIO_5	CI Interface	CI_A5
GPIO_6	CI Interface	CI_A6
GPIO_7	CI Interface	CI_A7
GPIO_8	CI Interface	CI_A8
GPIO_9	CI Interface	CI_A9
GPIO_10	CI Interface	CI_A10
GPIO_11	CI Interface	CI_A11
GPIO_12	CI Interface	CI_A12
GPIO_13	CI Interface	CI_A13
GPIO_14	CI Interface	CI_A14
GPIO_15	CI Interface	CI_A15
GPIO_16	CI Interface	CI_A16
GPIO_17	CI Interface	CI_A17
GPIO_18	CI Interface	CI_A18
GPIO_19	CI Interface	CI_A19
GPIO_20	CI Interface	CI_A20
GPIO_21	CI Interface	CI_A21
GPIO_22	CI Interface	CI_A22
GPIO_23	CI Interface	CI_A23
GPIO_24	CI Interface	CI_A24
GPIO_25	CI Interface	CI_A25
GPIO_26	CI Interface	CI_D0
GPIO_27	CI Interface	CI_D1
GPIO_28	CI Interface	CI_D2
GPIO_29	CI Interface	CI_D3
GPIO_30	CI Interface	CI_D4
GPIO_31	CI Interface	CI_D5
GPIO_32	CI Interface	CI_D6
GPIO_33	CI Interface	CI_D7
GPIO_34	CI Interface	CI_D8
GPIO_35	CI Interface	CI_D9
GPIO_36	CI Interface	CI_D10
GPIO_37	CI Interface	CI_D11
GPIO_38	CI Interface	CI_D12
GPIO_39	CI Interface	CI_D13
GPIO_40	CI Interface	CI_D14
GPIO_41	CI Interface	CI_D15
GPIO_42	MT8283 Clock	27MHz_MT8283
GPIO_43	USB Power Enable	USB_PWR_EN0
GPIO_44	USB Power Enable	USB_PWR_EN1
GPIO_45	EMMC Reset	RST_n
GPIO_46	SYSTEM EEPROM write protect	SYS_EEPROM_WP
GPIO_47	Back light on/off	BL_ON/OFF
GPIO_48	HDMI ARC mute	ARC_MUTE
GPIO_49	PWM AMP MUTE	AMP_MUTE
GPIO_50	Demod reset	GPIO50
GPIO_51	Audio mute	MUTE_CTL
GPIO_52	3D	ctrl_3dr(O)
GPIO_53	3D	ctrl_3dl(O)
GPIO_54	3D	ctrl_3dbl(O)
GPIO_55	3D	irtx0 (I/O)

PIN NAME	GPIO Function	Function define
OPWM0	Tuner 30V power	PWM48K_BST_30V
OPWM1	Back light DIMMING	BL_DIMMING
OPWM2	Standby power LED	Standby_LED

PIN NAME	GPIO Function	Function define
ADIN0_SRV	Function Select	SCART_FS0
ADIN1_SRV	Function Select	SCART_FS1
ADIN2_SRV	ADIN2_SRV	
ADIN3_SRV	ADIN3_SRV	
ADIN4_SRV	USB_OC_P0/P1	USB OC control
ADIN5_SRV	USB_OC_P2/P3	USB OC control
ADIN6_SRV	Demo RF AGC	RF_AGCI
ADIN7_SRV	EPI LOCK	EPI LOCKN

PIN NAME	GPIO Function	Function define
OPCTRL0	SAW ATD mode use	OPCTRL0
OPCTRL1	SAW ATD mode use	OPCTRL1
OPCTRL2	CI Interface	AV_LINK
OPCTRL3	Strapping	Strap[0]
OPCTRL4	PCIe slot reset	PCIe_RST
OPCTRL5	CI Card Power Control	CI_OCP
OPCTRL6	HeadPhone detect	OPCTRL6
OPCTRL7	Core Power Control	OPCTRL7
OPCTRL8	ATD only mode use	OPCTRL8
OPCTRL9	LVDS Power Control	LVDS_PWR_EN
OPCTRL10	USB Power Enable	USB_PWR_EN3
OPCTRL11	USB Power Enable	USB_PWR_EN2

PIN NAME	GPIO Function	Function define
LED_PWM0	Strap[2]	LED_PWM0
LED_PWM1	Strap[1]	LED_PWM1

MTK Confidenti
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Trouble Shooting Guide for LG Service Man

Please check system, after power Off/On one time

1. Power-Up Boot Fail Trouble Shooting
2. No OSD Trouble Shooting
3. Digital TV Video Trouble Shooting
4. Analog TV Video Trouble Shooting
5. Component Video Trouble Shooting
6. RGB Video Trouble Shooting
7. AV Video Trouble Shooting
8. HDMI Video Trouble Shooting
9. All Source Audio Trouble Shooting
10. Digital TV Audio Trouble Shooting
11. Analog TV Audio Trouble Shooting
12. Component / RGB / AV Audio Trouble Shooting
13. HDMI Audio Trouble Shooting
14. USB Trouble Shooting
15. Digital TV Recording Fail Trouble Shooting
16. Analog TV Recording Fail Trouble Shooting
17. AV Video Recording Fail Trouble Shooting
18. Digital TV Video Trouble Shooting while recording (Watch & Record)
19. Digital TV Audio Trouble Shooting while recording (Watch & Record)
20. Analog TV Video Trouble Shooting while recording (Watch & Record)
21. Analog TV Audio Trouble Shooting while recording (Watch & Record)

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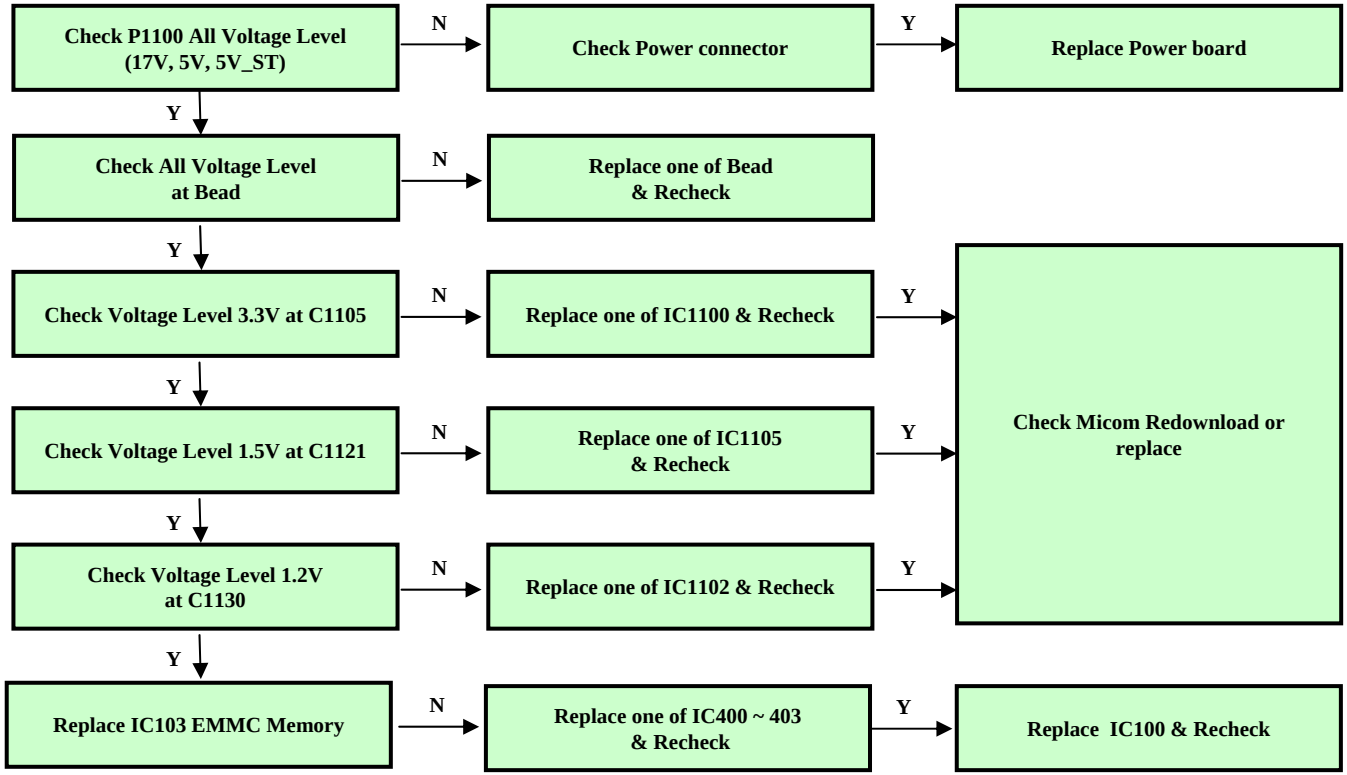
1. Power-Up Boot Fail Trouble Shooting



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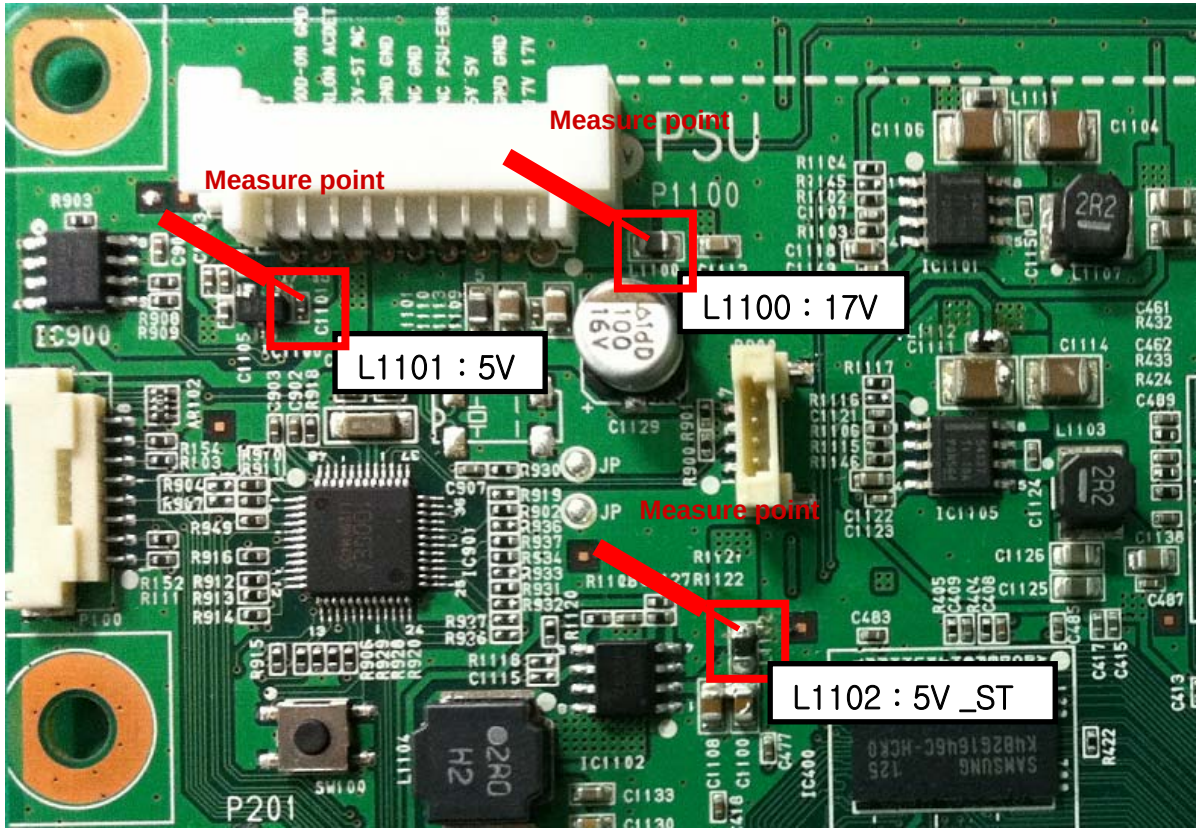
■ Power check

1. PSU voltage check

P1100			
1	17V	2	17V
3	GND	4	GND
5	5V	6	SV
7	NC	8	PSU_ERR
9	NC	10	GND
11	GND	12	GND
13	5V_ST	14	NC
15	RL_ON	16	AC_DET
17	MOD_ON	18	GND



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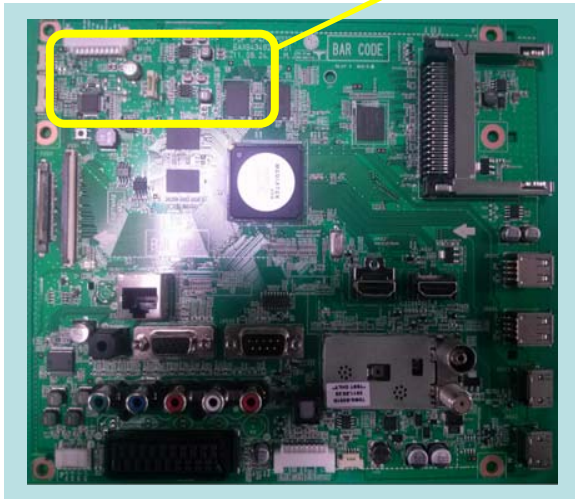

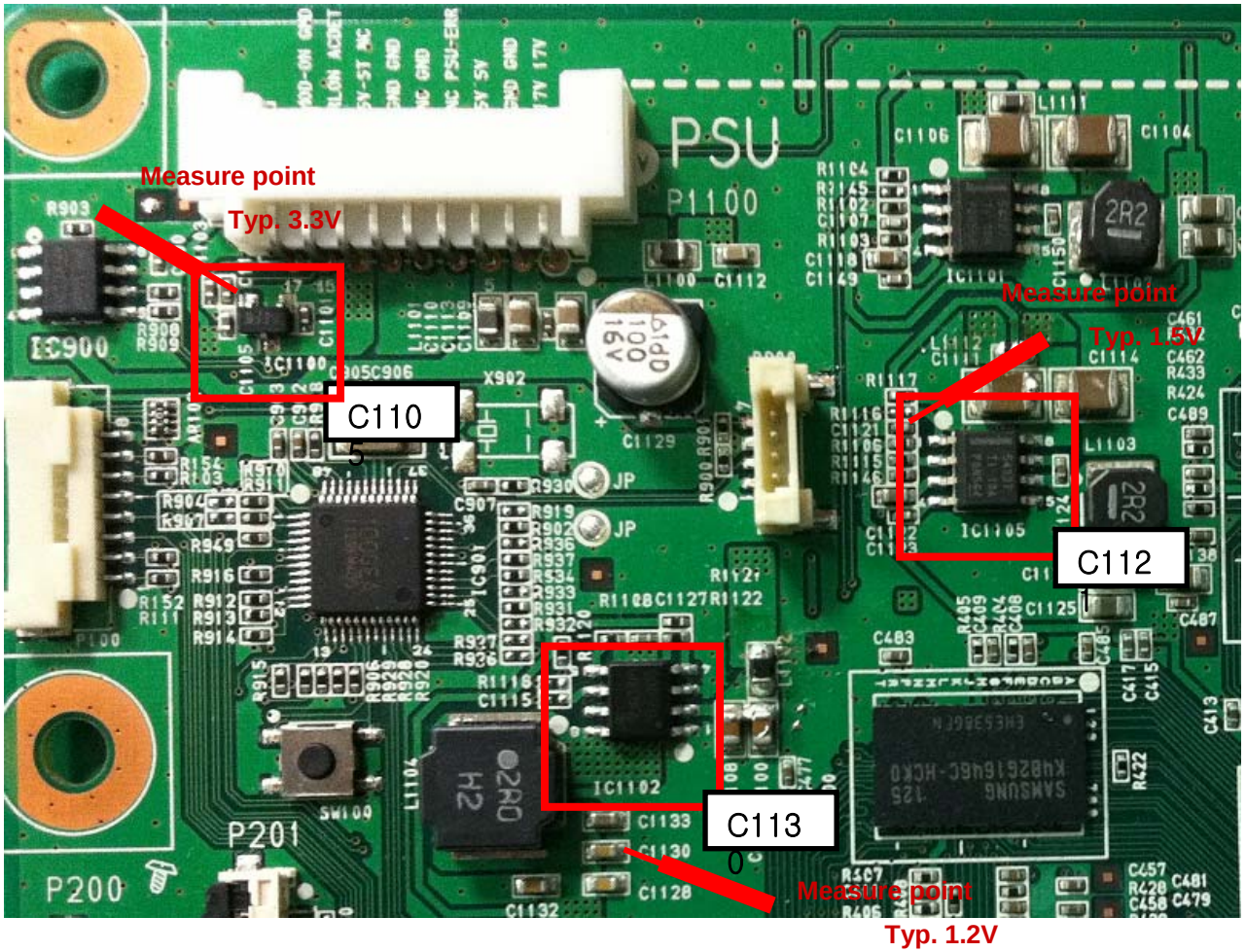

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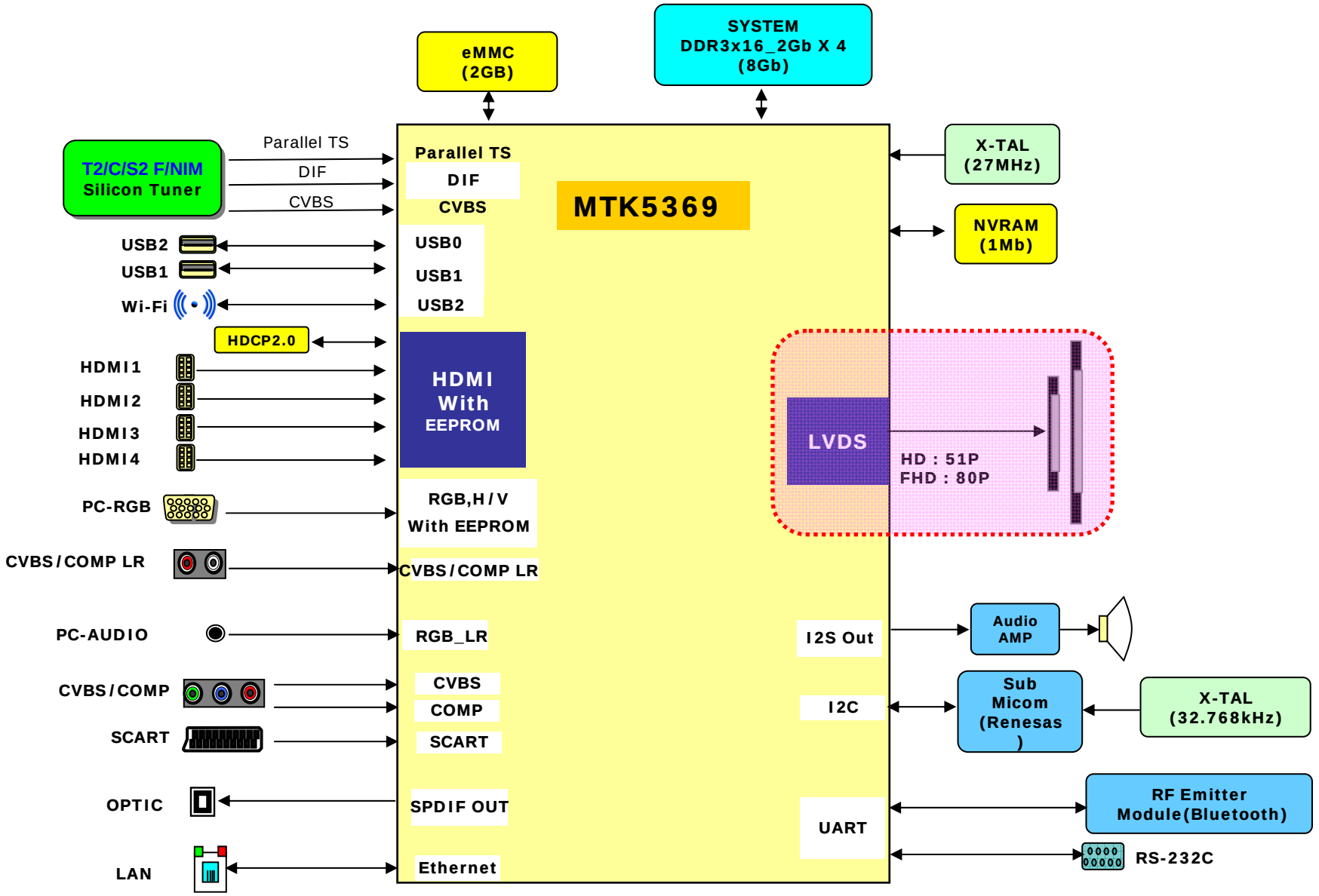
2. No OSD Trouble Shooting



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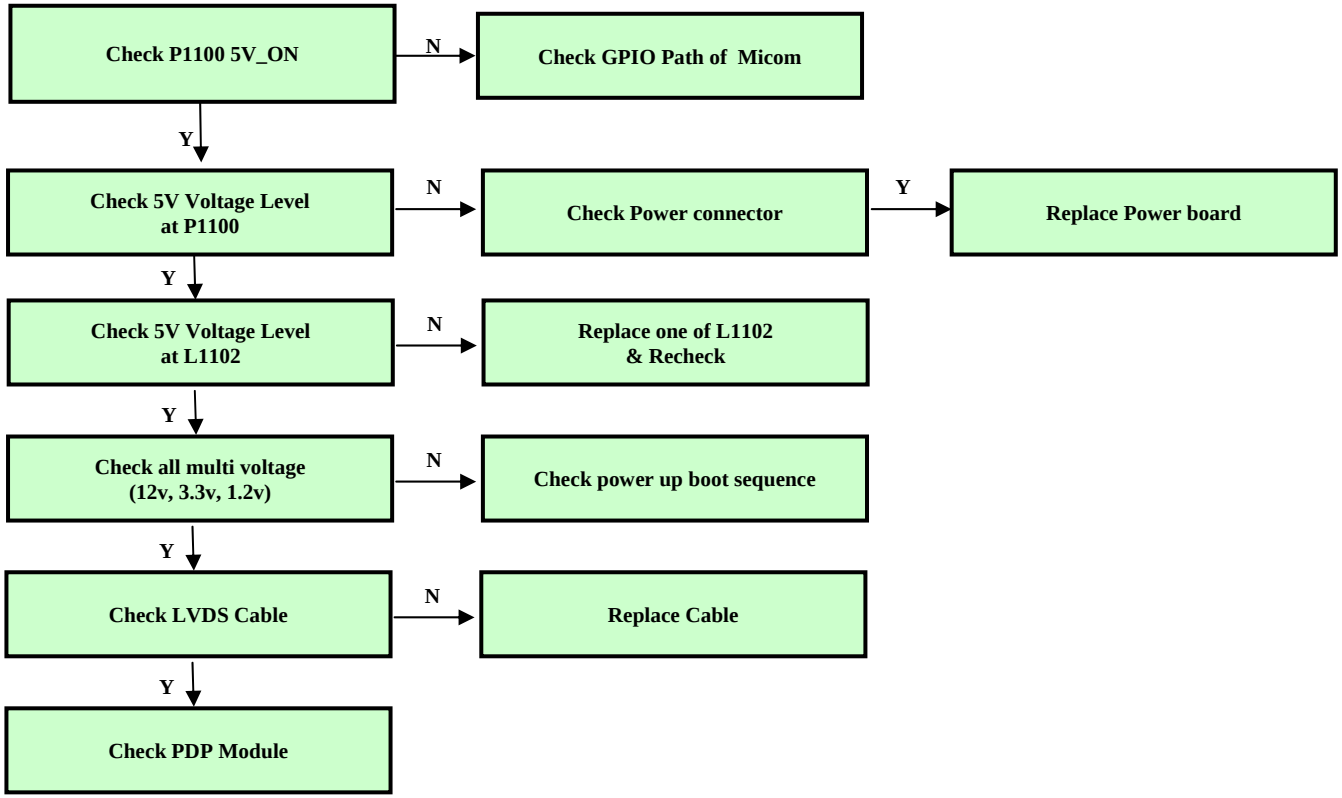
2. No OSD Trouble Shooting



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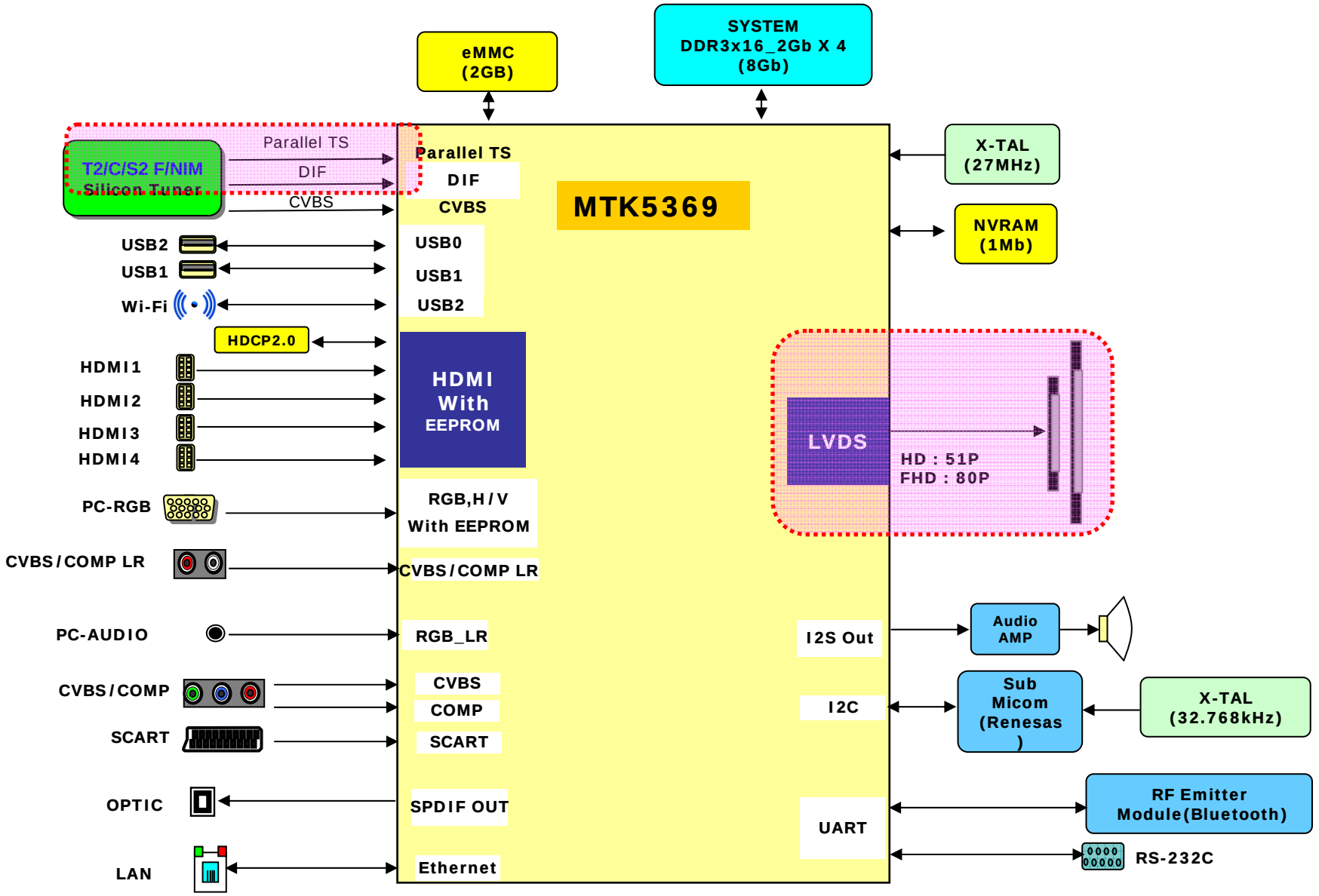
3. Digital TV Video Trouble Shooting



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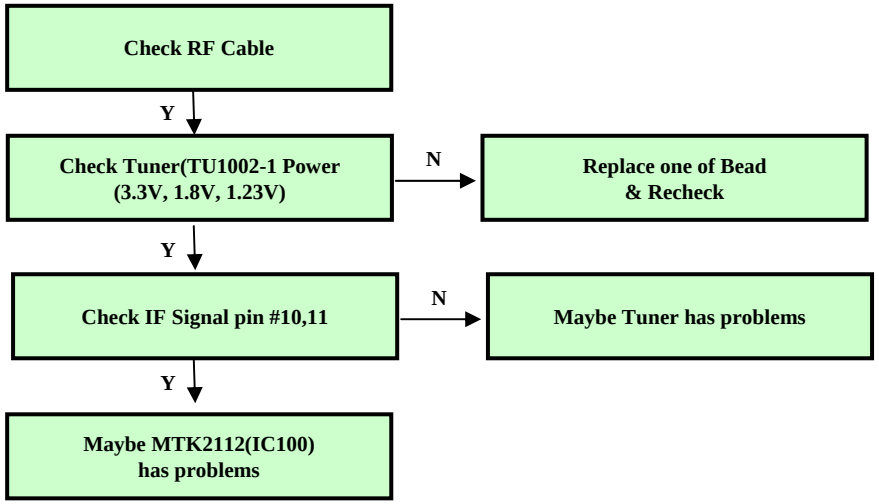
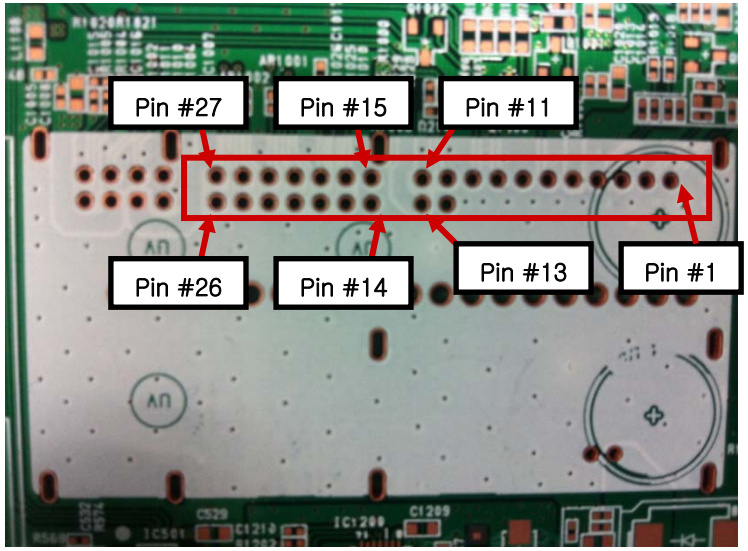
3. Digital TV Video Trouble Shooting



Checking order

1. Check Tuner power (Pin #5, #7)
2. Check Tuner I2C level (Pin #3, #4)
3. Check Tuner IF Signal (Pin #10, #11)
4. Check Ts level (Pin #20, #21, #22, #23, #24, #25, #26, #27)
5. Check Ts Signal



Pin No.	Description
1	NC_1
2	RESET
3	SCL
4	SDA
5	3.3V
6	SIF
7	1.8V
8	CVBS
9	T/C_IF_AGC
10	T/C_DIF[P]
11	T/C_DIF[N]
12	NC_2
13	NC_3
14	NC_4
15	GND_1
16	ERROR
17	SYNC
18	VALID
19	MCLK
20	D0
21	D1
22	D2
23	D3
24	D4
25	D5
26	D6
27	D7
28	GND_2
29	GND_3
30	1.23V
31	S2_RESET
32	3.3V
33	S2_F22_OUTPUT
34	S2_SCL
35	S2_SDA
36	LNB
37	GND_4

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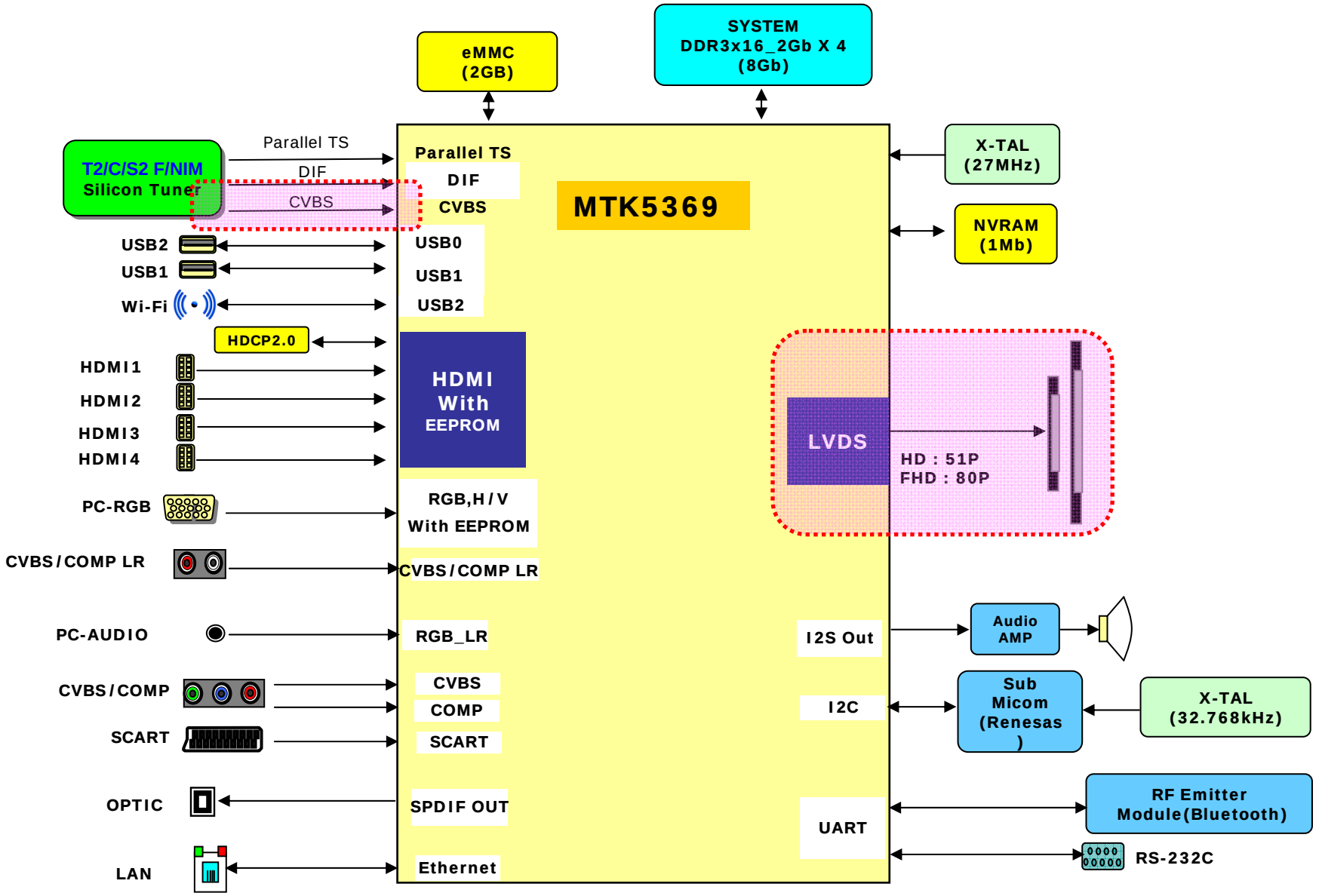
4. Analog TV Video Trouble Shooting



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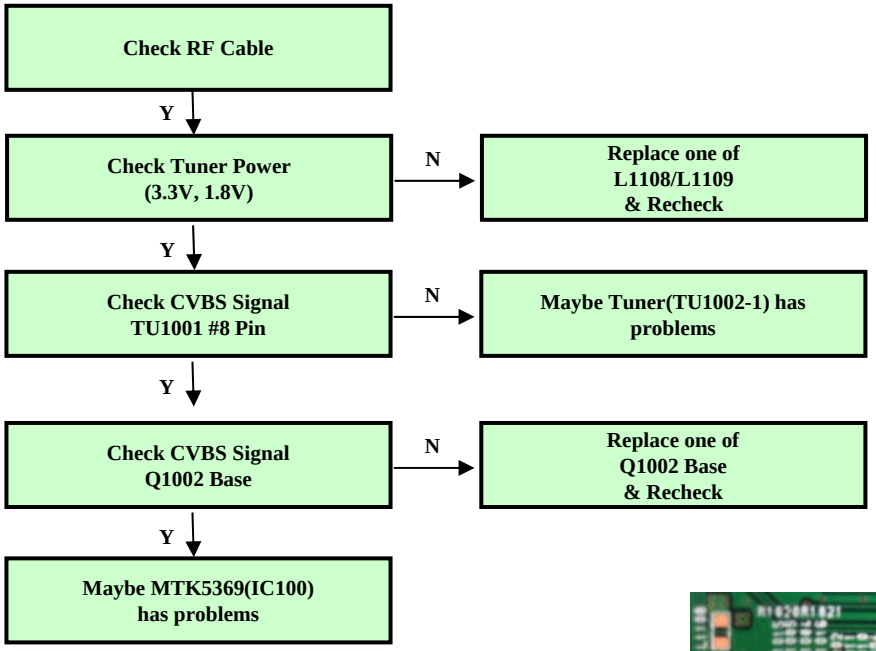
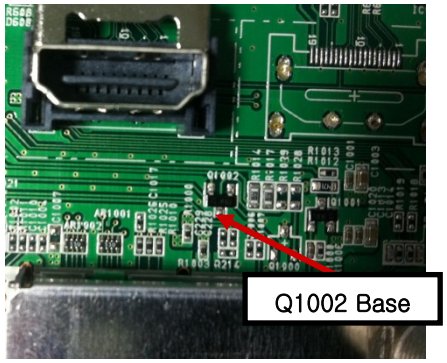
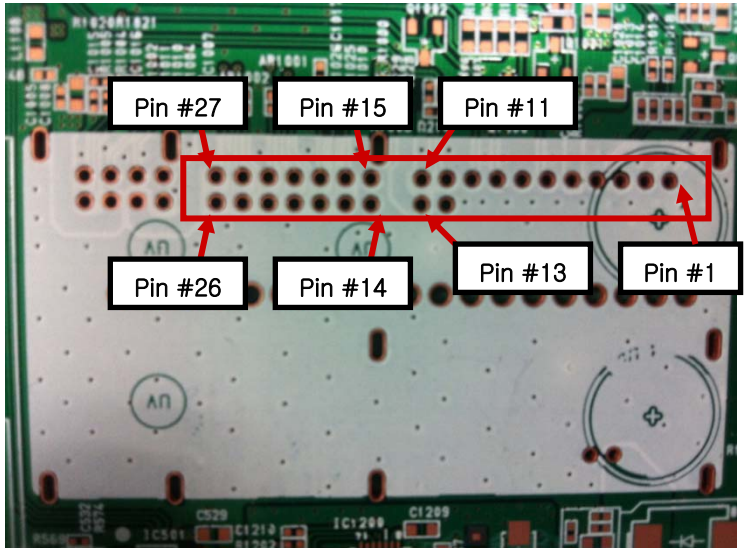
4. Analog TV Video Trouble Shooting







Checking order

1. Check Tuner power (Pin #5, #7)
2. Check Tuner I2C level (Pin #3, #4)
3. Check Video signal (Pin #8)

Pin No.	Description
1	NC_1
2	RESET
3	SCL
4	SDA
5	3.3V
6	SIF
7	1.8V
8	CVBS
9	T/C_IF_AGC
10	T/C_DIF[P]
11	T/C_DIF[N]
12	NC_2
13	NC_3
14	NC_4
15	GND_1
16	ERROR
17	SYNC
18	VALID
19	MCLK
20	D0
21	D1
22	D2
23	D3
24	D4
25	D5
26	D6
27	D7
28	GND_2
29	GND_3
30	1.23V
31	S2_RESET
32	3.3V
33	S2_F22_OUTPUT
34	S2_SCL
35	S2_SDA
36	LNB
37	GND_4

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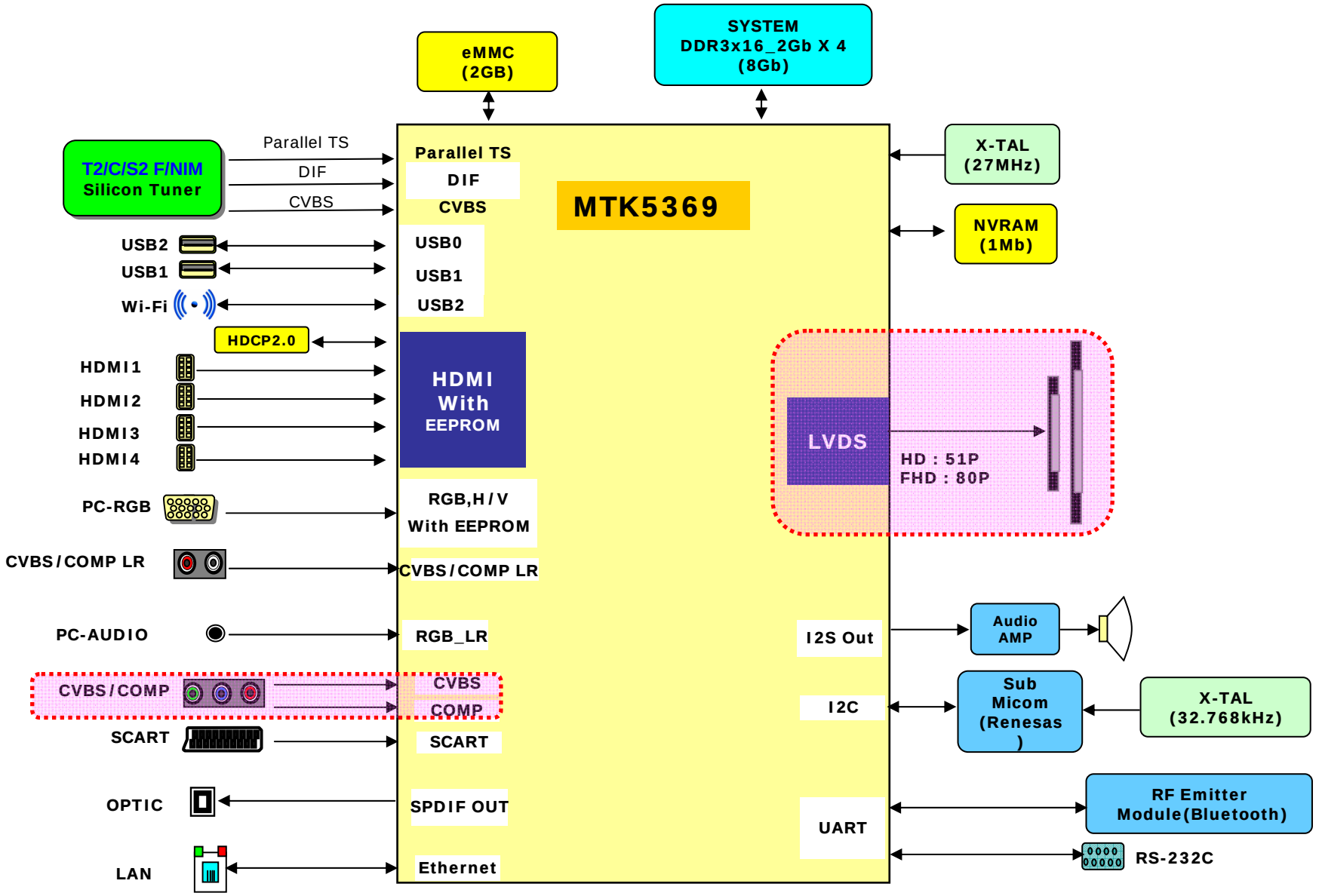
5. Component Video Trouble Shooting



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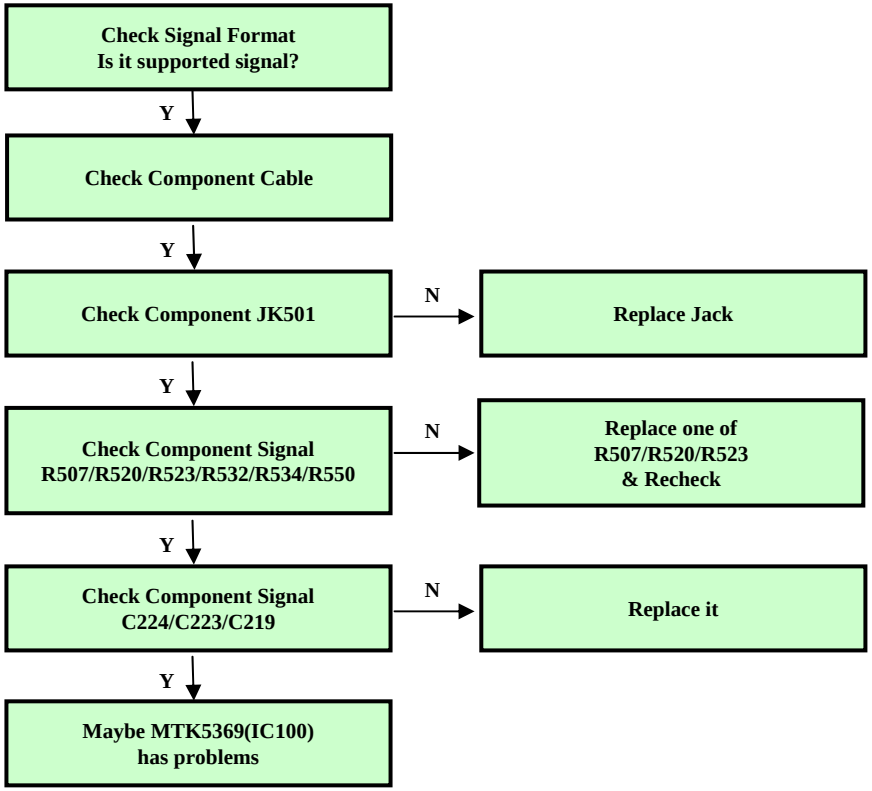
5. Component Video Trouble Shooting



C257/C216/C212/

R532/R534/R550

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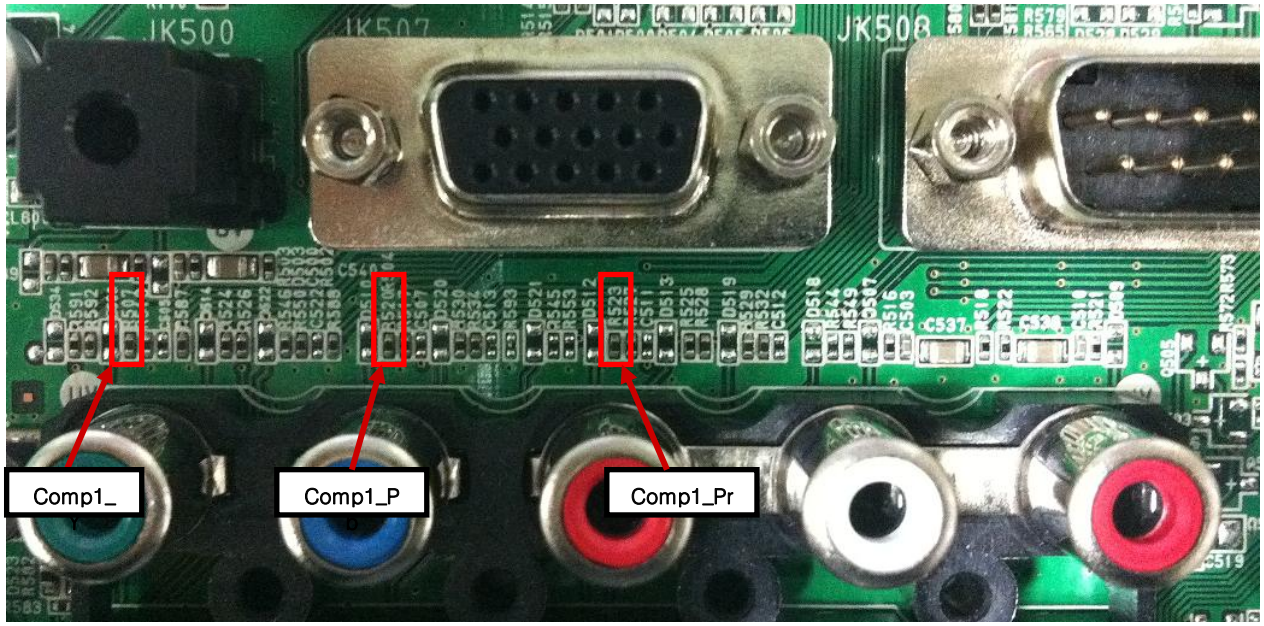
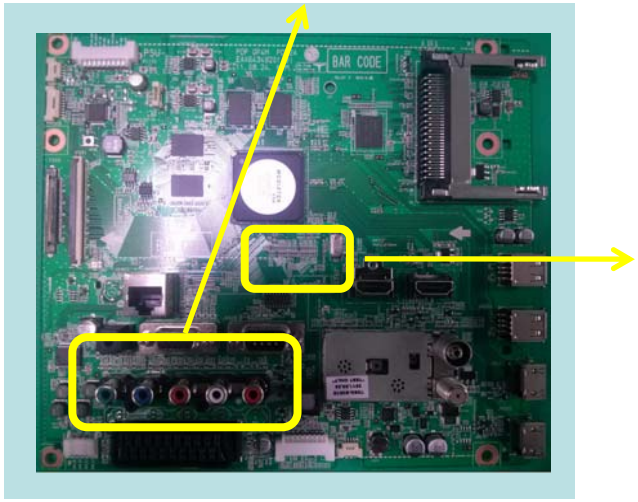
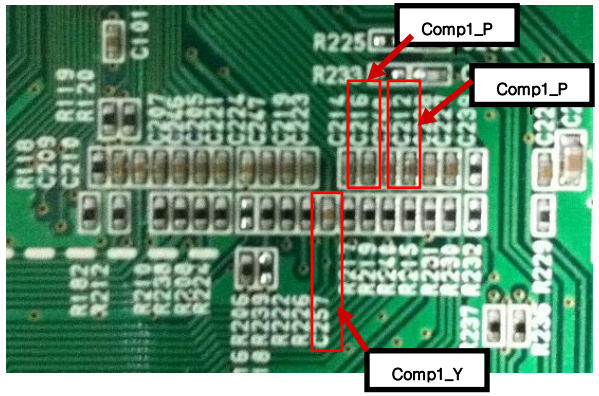
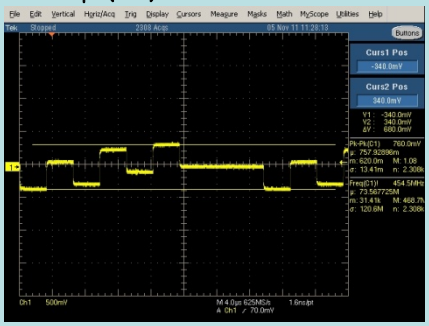




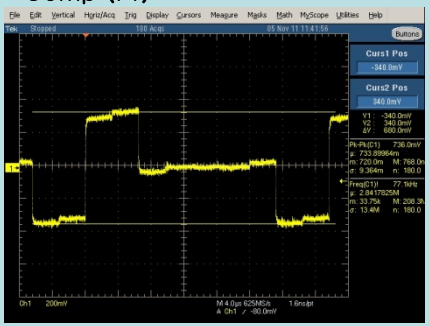


Comp (Y)

Comp (Pb)



Comp (Pr)



1920 X 1080 (i) Dot Freq : 74.25 MHz
H – Freq : 33.75 kHz
V – Freq : 60 Hz

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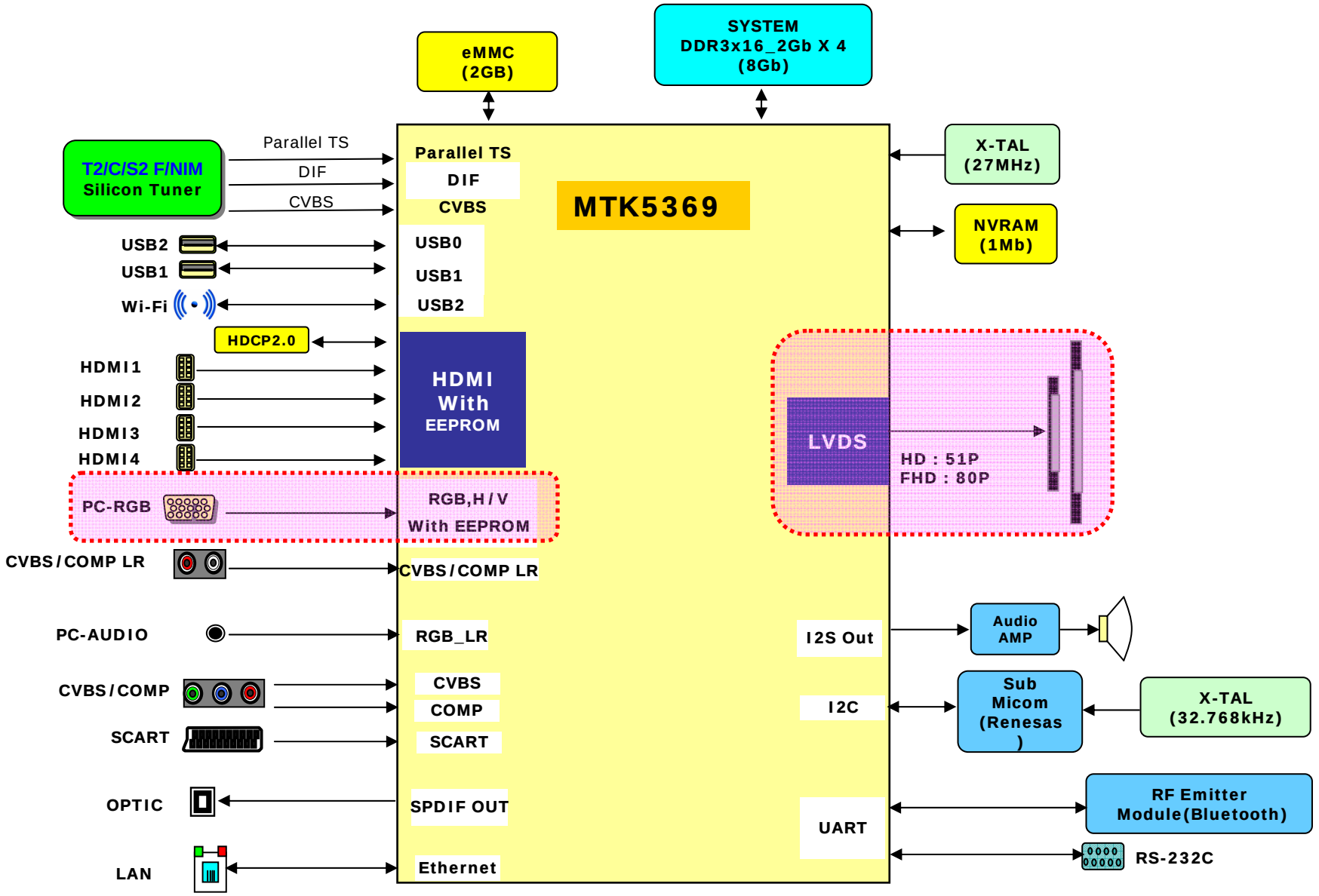
6. RGB Video Trouble Shooting



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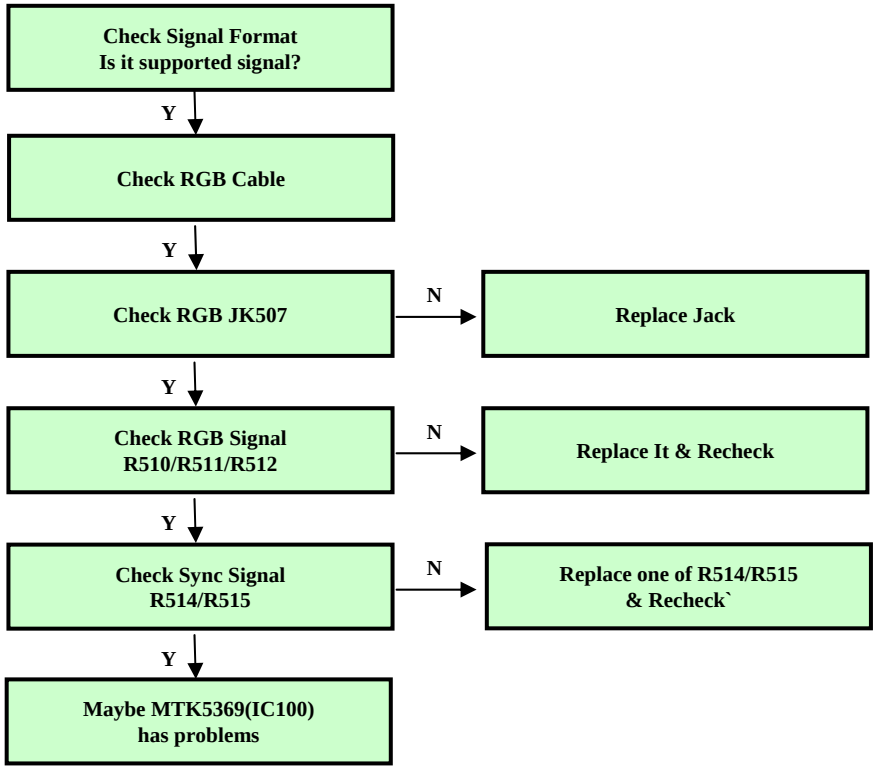
6. RGB Video Trouble Shooting



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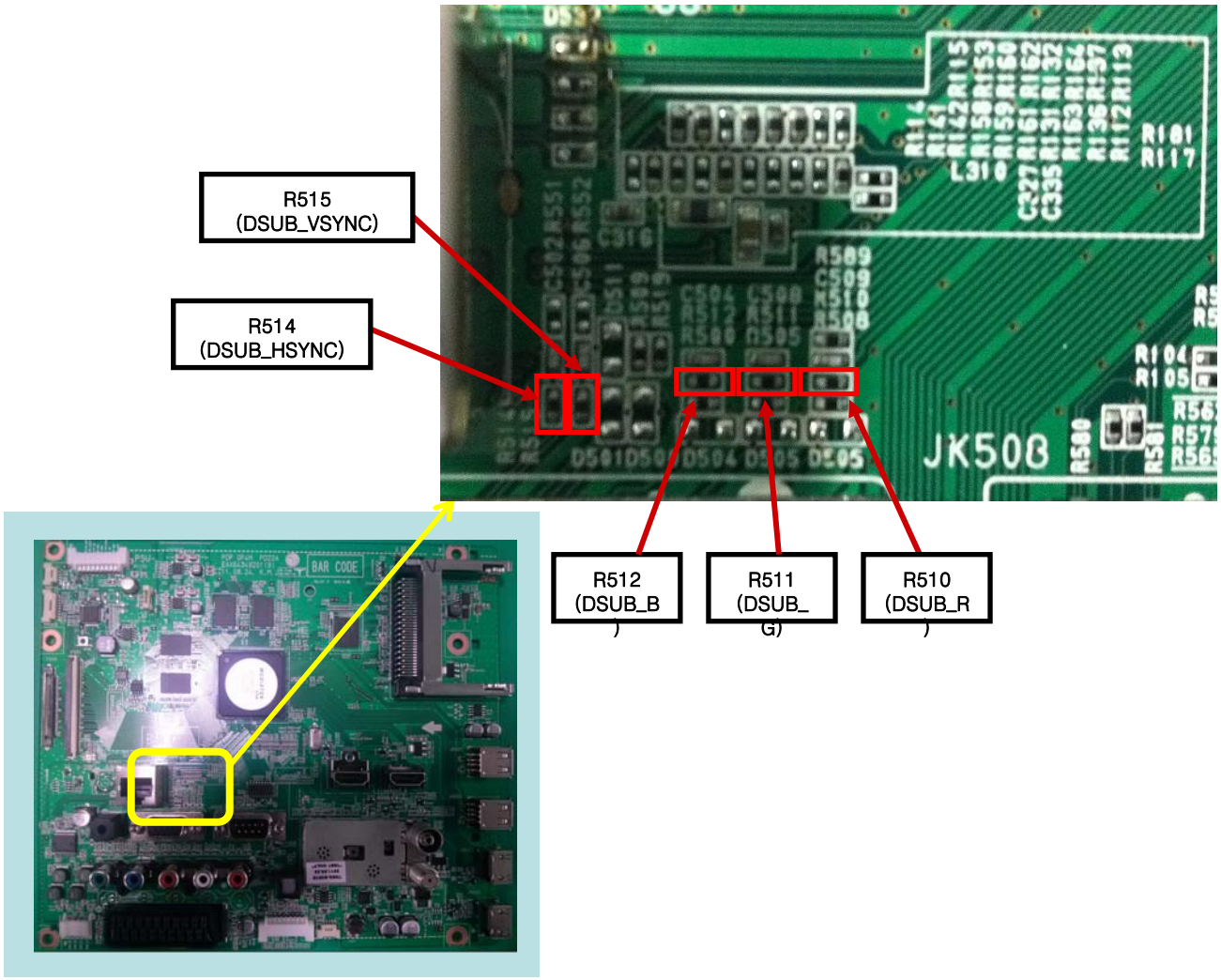
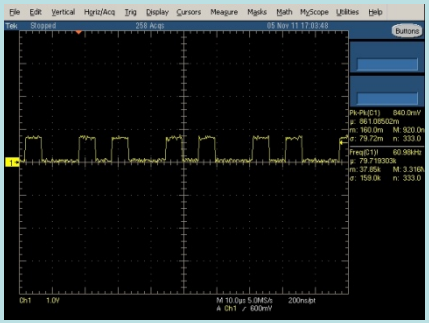
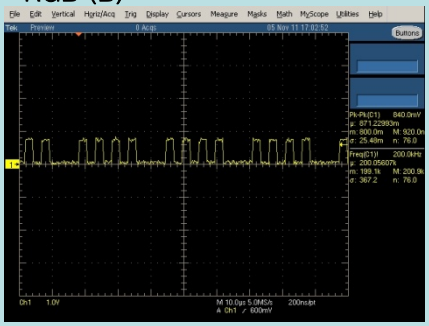


RGB (R)



RGB (G)

RGB (B)



800 X 600 (p)

Dot Freq : 40 MHz
H – Freq : 37.879 kHz
V – Freq : 60.317 Hz

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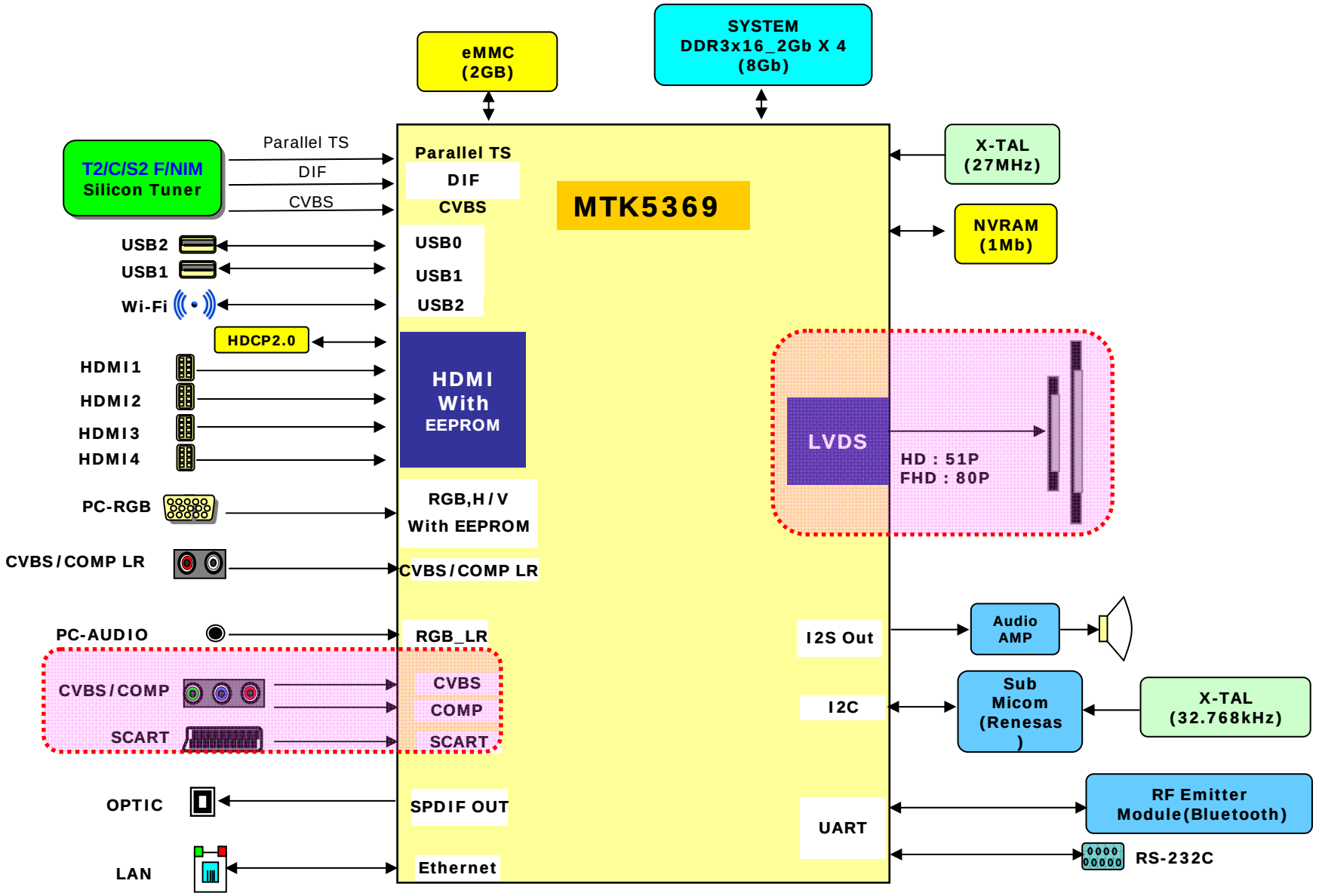
7. AV Video Trouble Shooting



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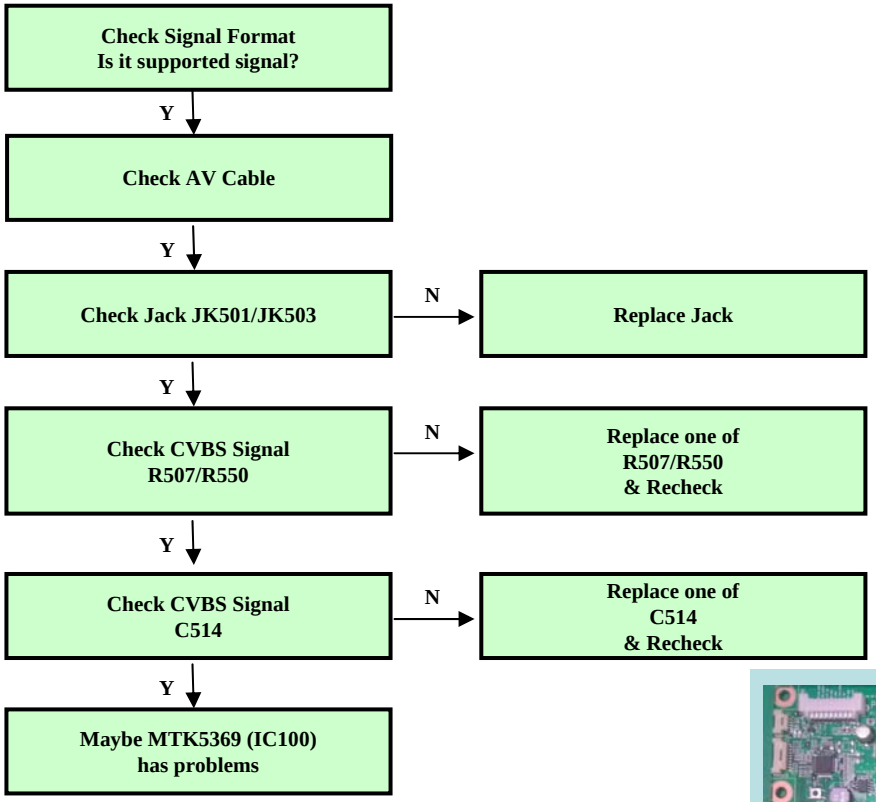
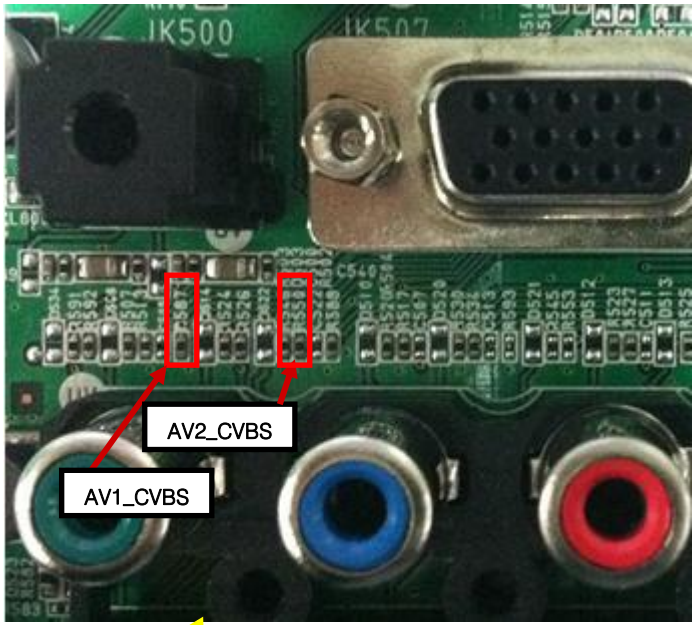
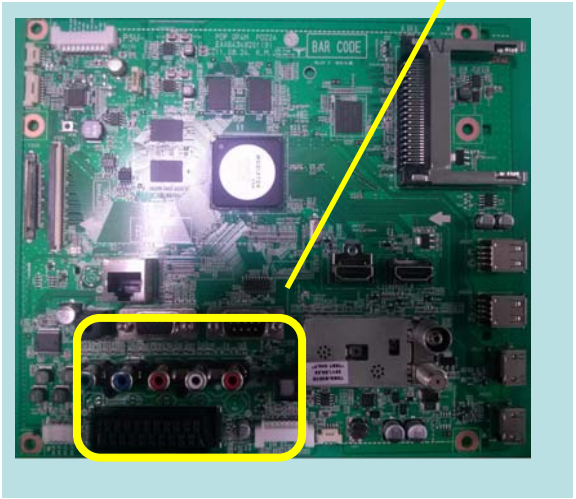
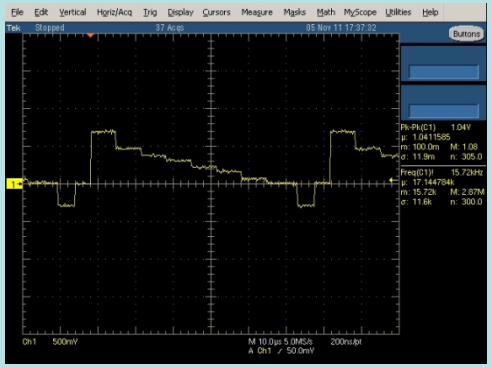
7. AV Video Trouble Shooting









720 X 480 (i)

Dot Freq : 13.5 MHz
H – Freq : 15.734 kHz
V – Freq : 59.939 Hz

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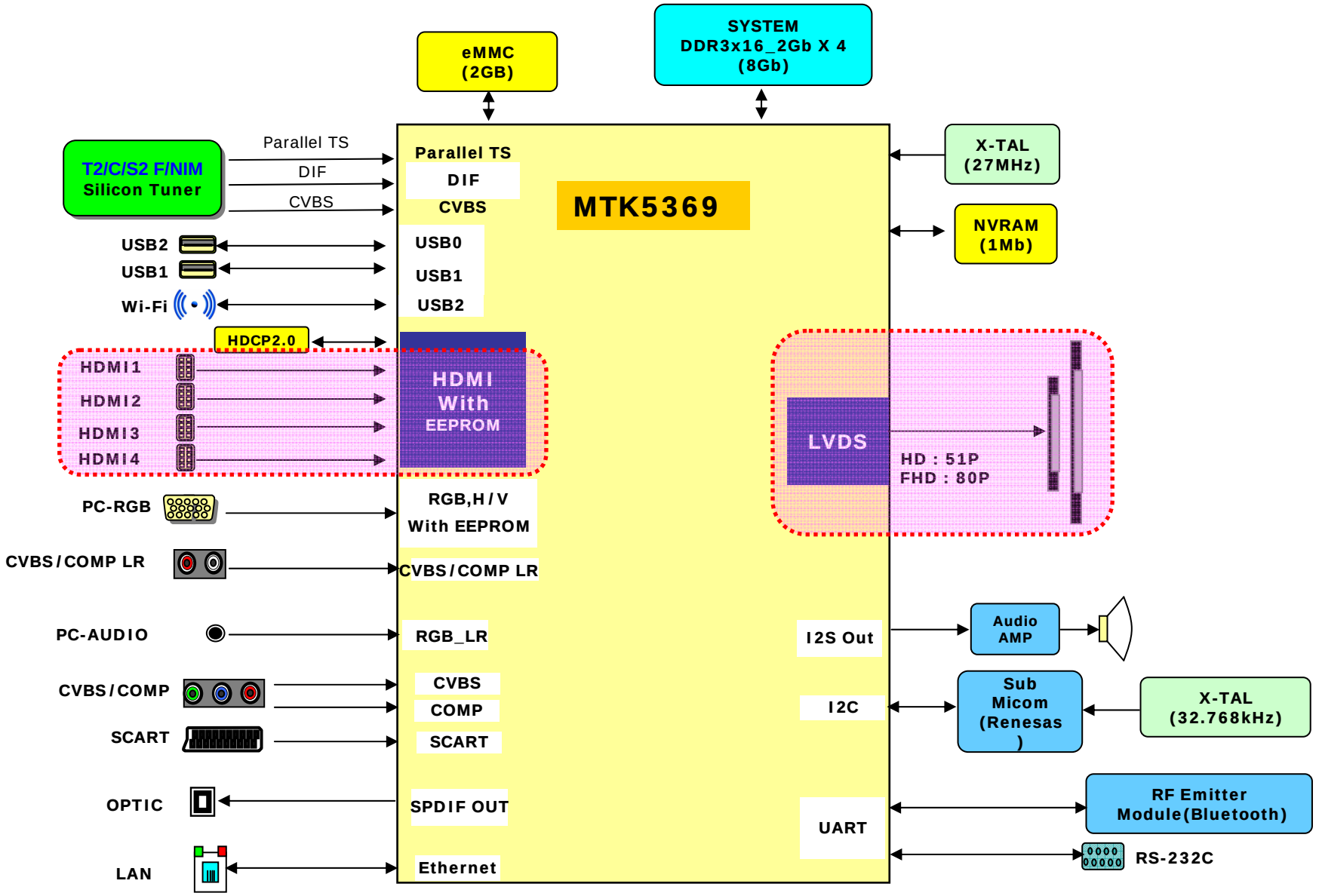
8. HDMI Video Trouble Shooting



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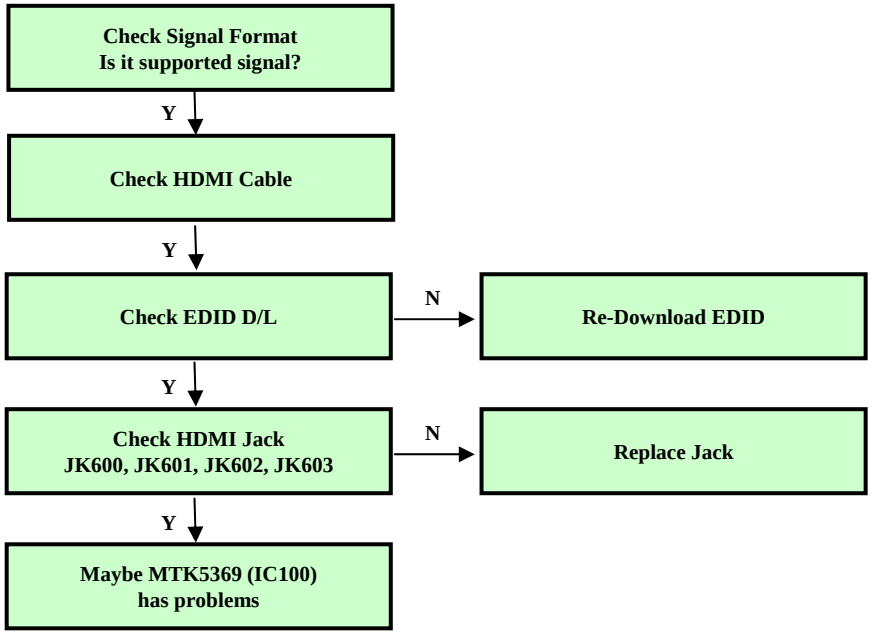
8. HDMI Video Trouble Shooting



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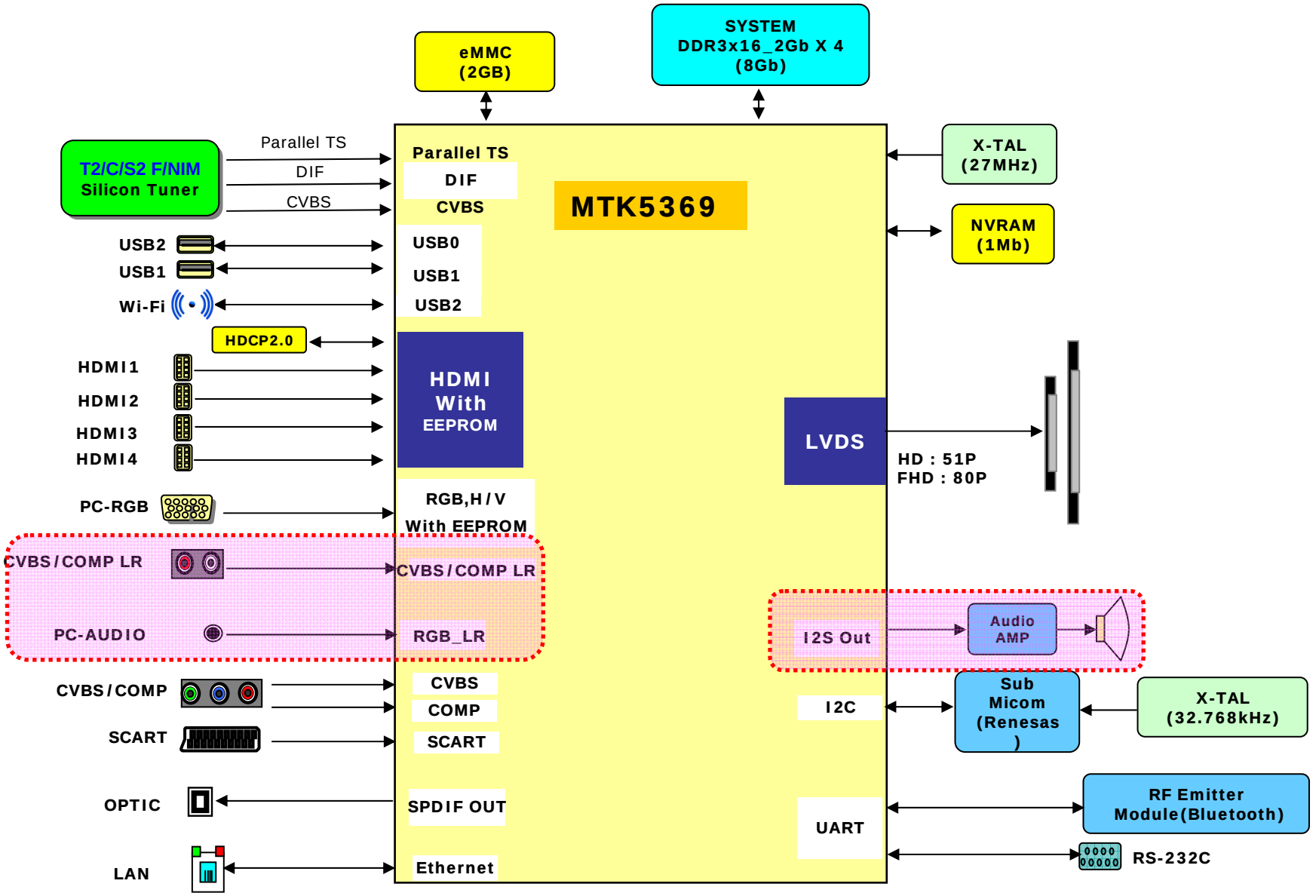
9. All Source Audio Trouble Shooting



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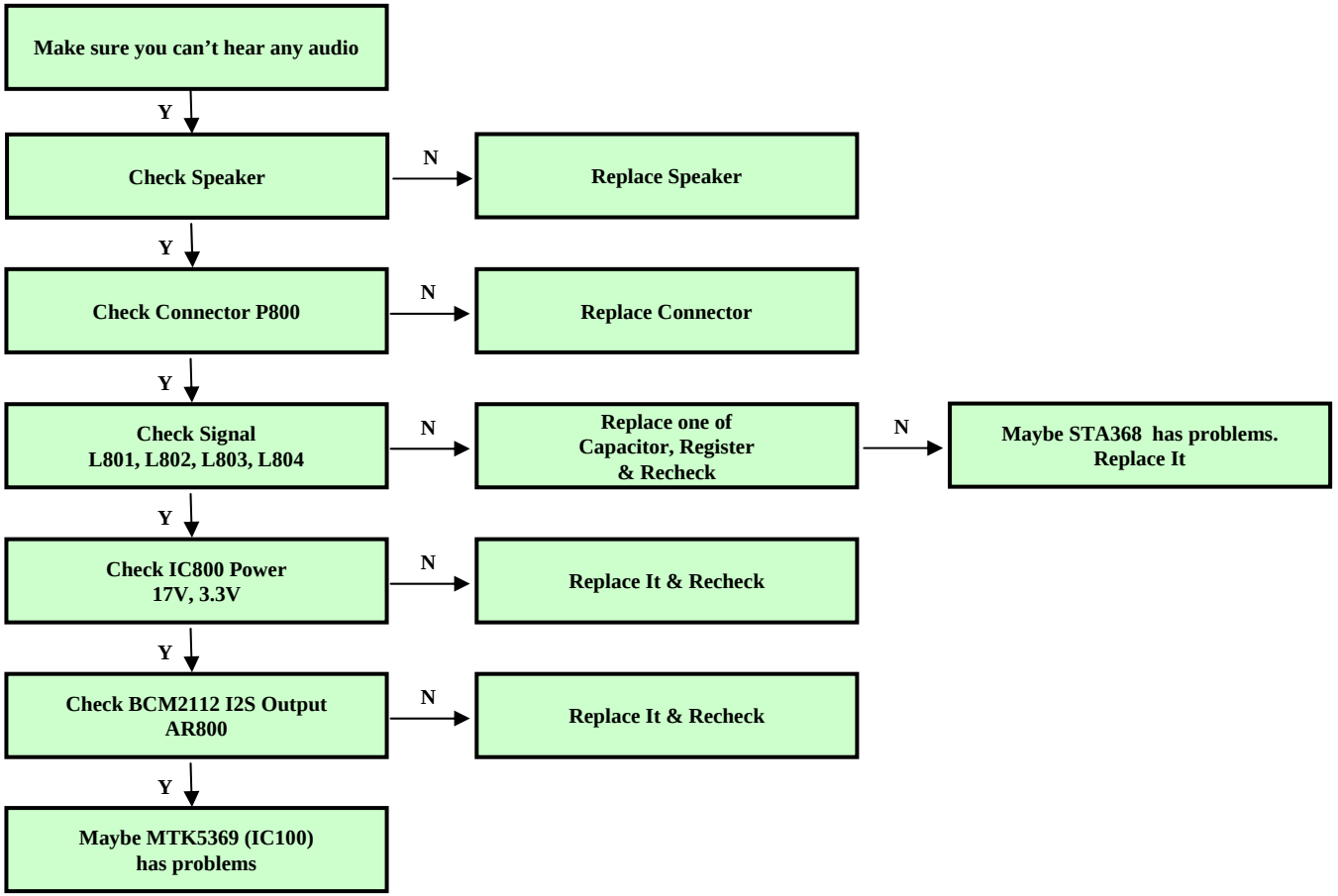
9. All Source Audio Trouble Shooting



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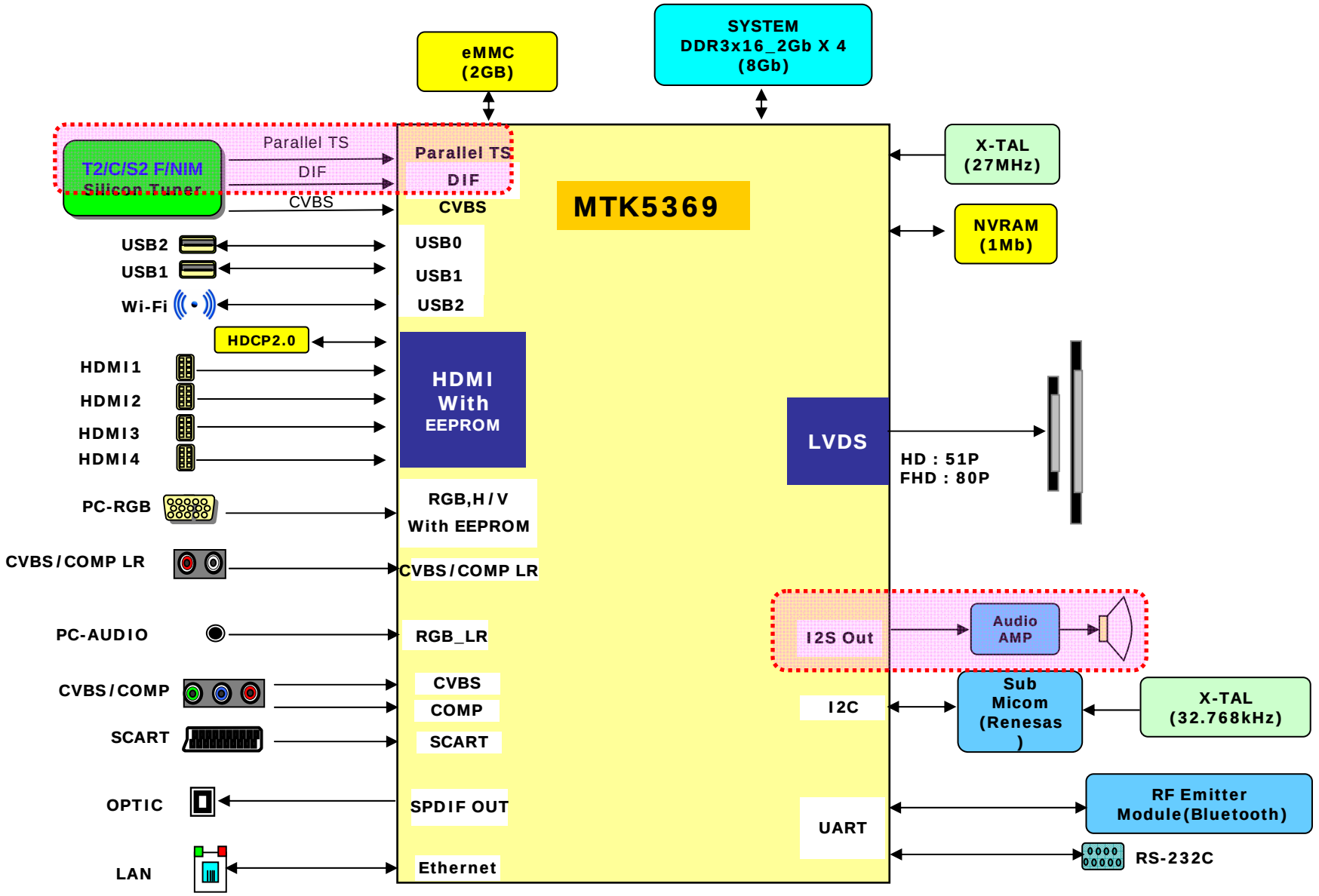
10. Digital TV Audio Trouble Shooting



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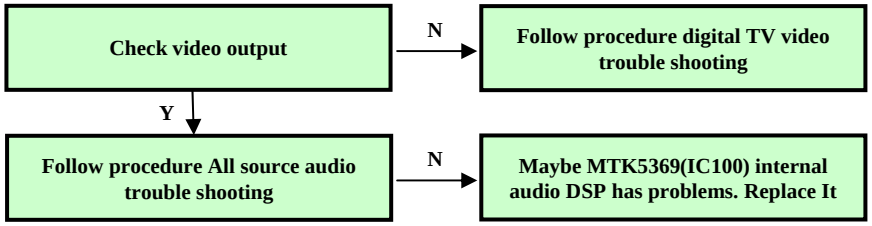
10. Digital TV Audio Trouble Shooting


Check video output
N
Follow procedure digital TV video trouble shooting
Y
Follow procedure All source audio trouble shooting
N
Maybe MTK5369(IC100) internal audio DSP has problems. Replace It

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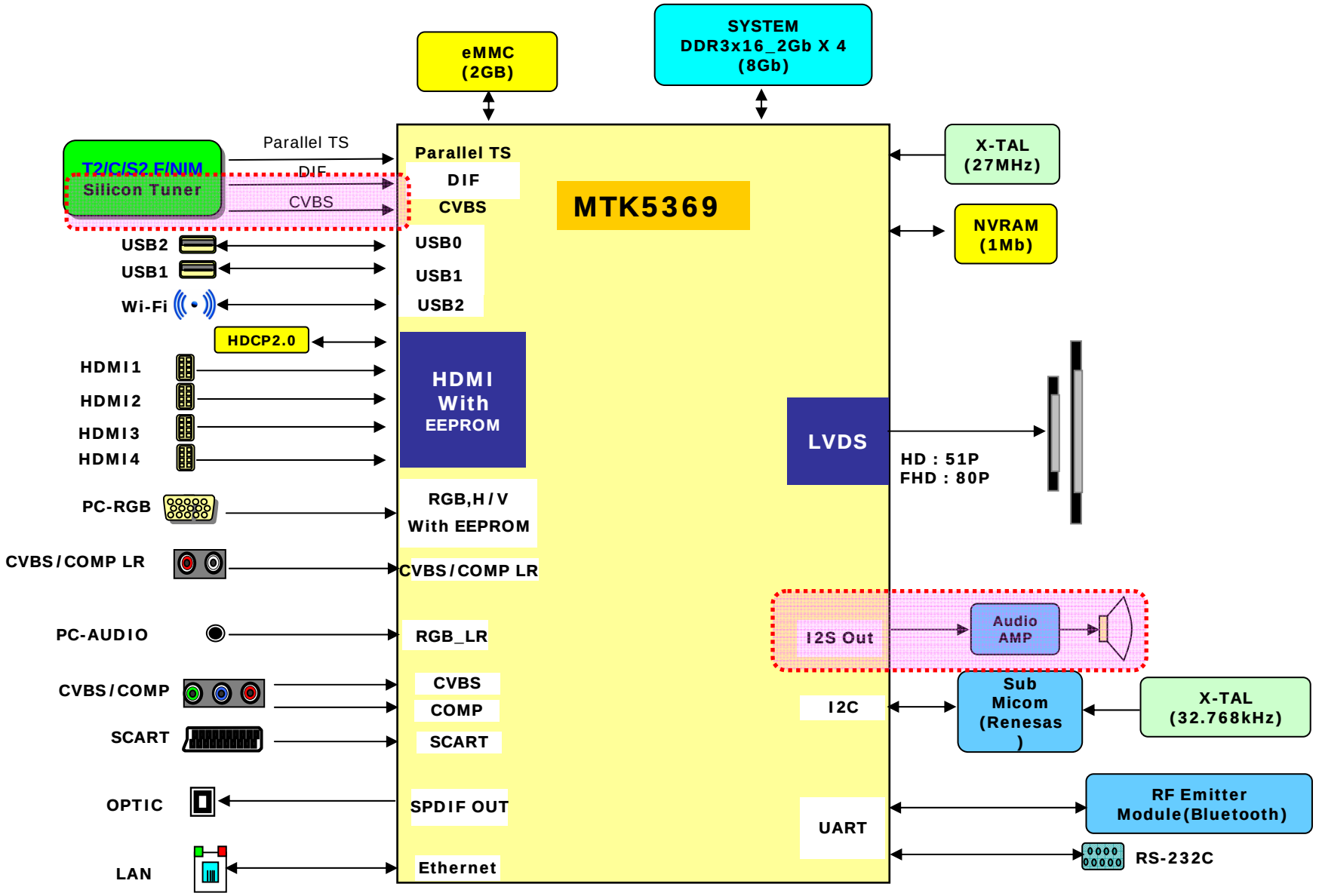
11. Analog TV Audio Trouble Shooting



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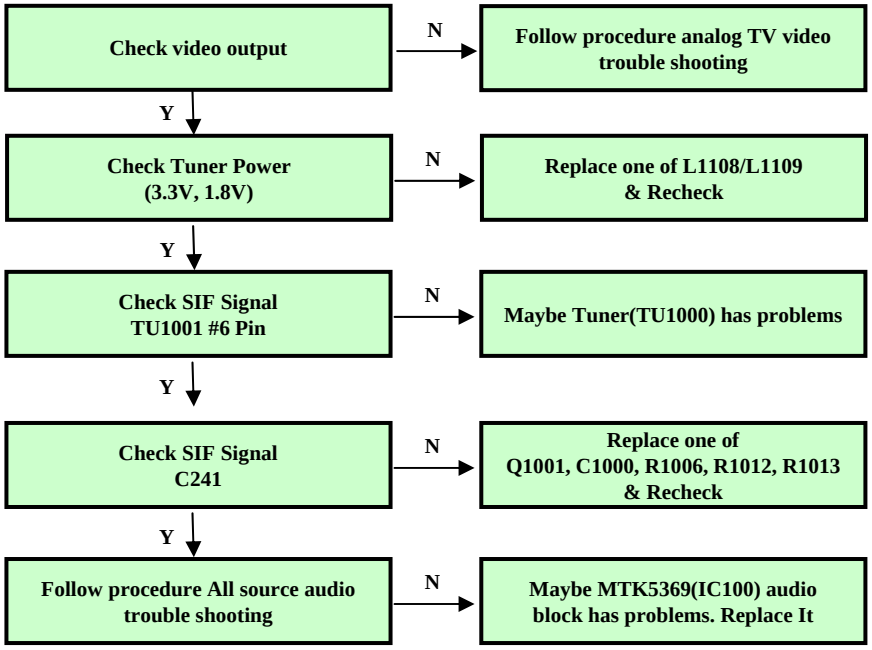
11. Analog TV Audio Trouble Shooting



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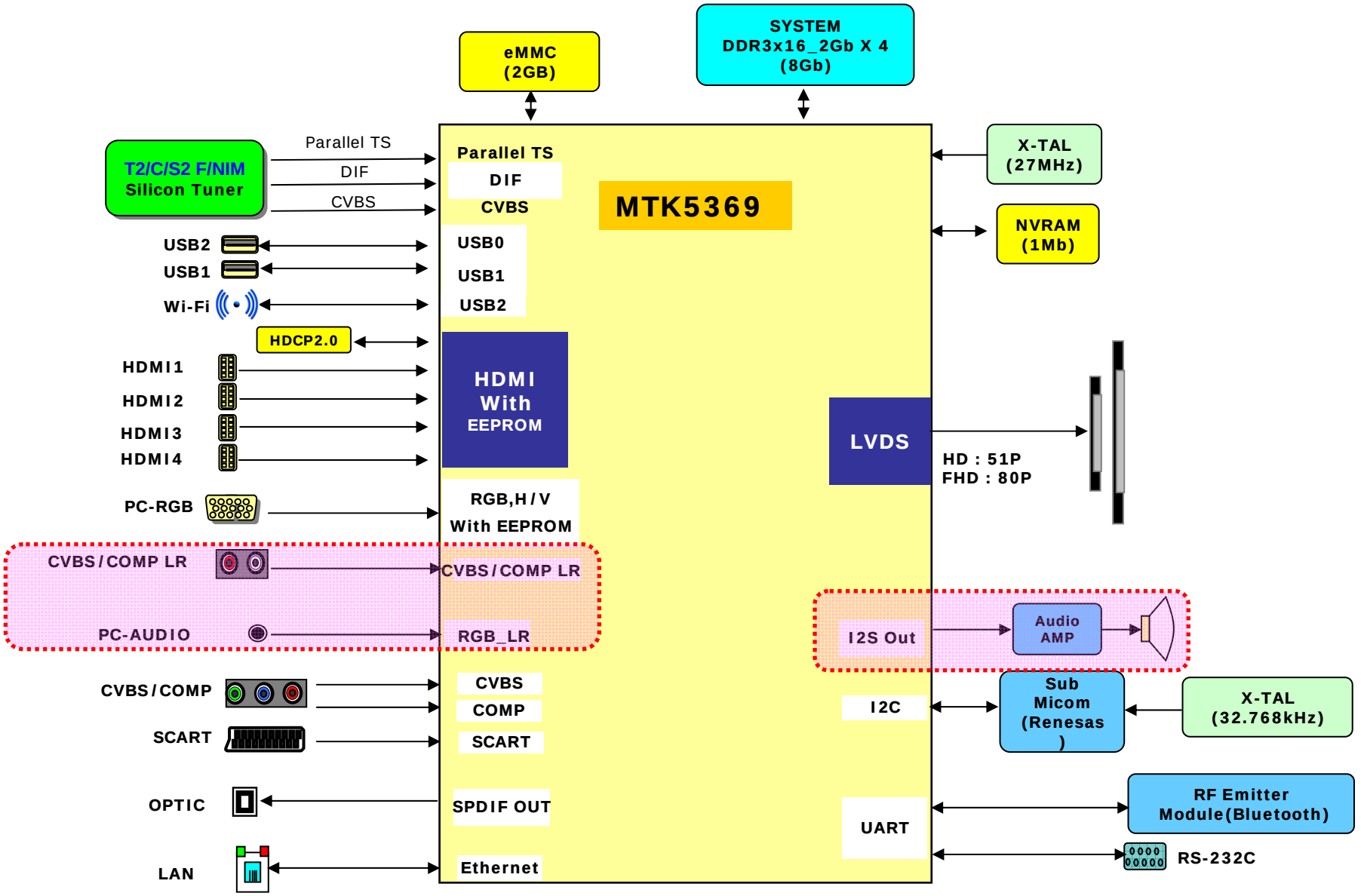
12. Component / RGB / AV Audio Trouble Shooting



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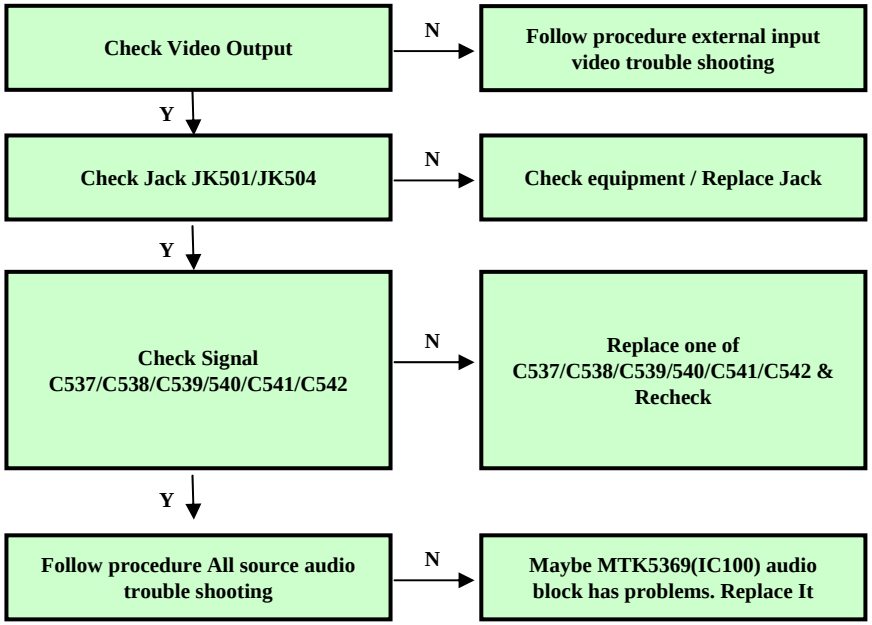
12. Component / RGB / AV Audio Trouble Shooting



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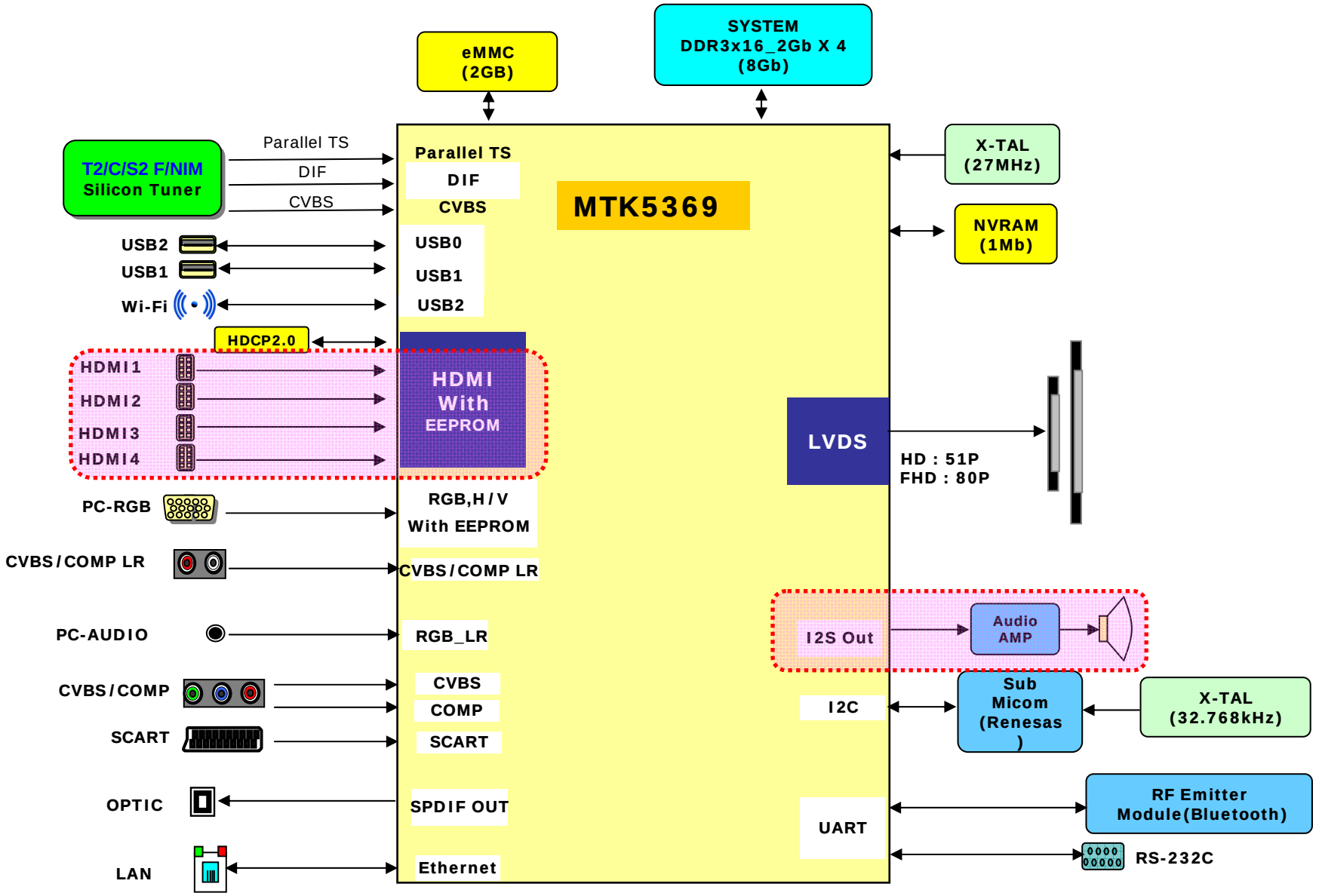
13. HDMI Audio Trouble Shooting



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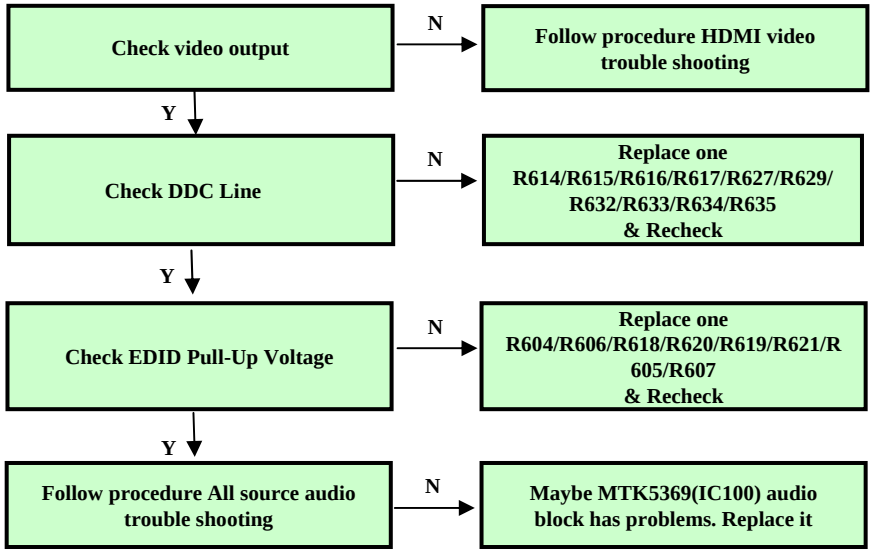
13. HDMI Audio Trouble Shooting



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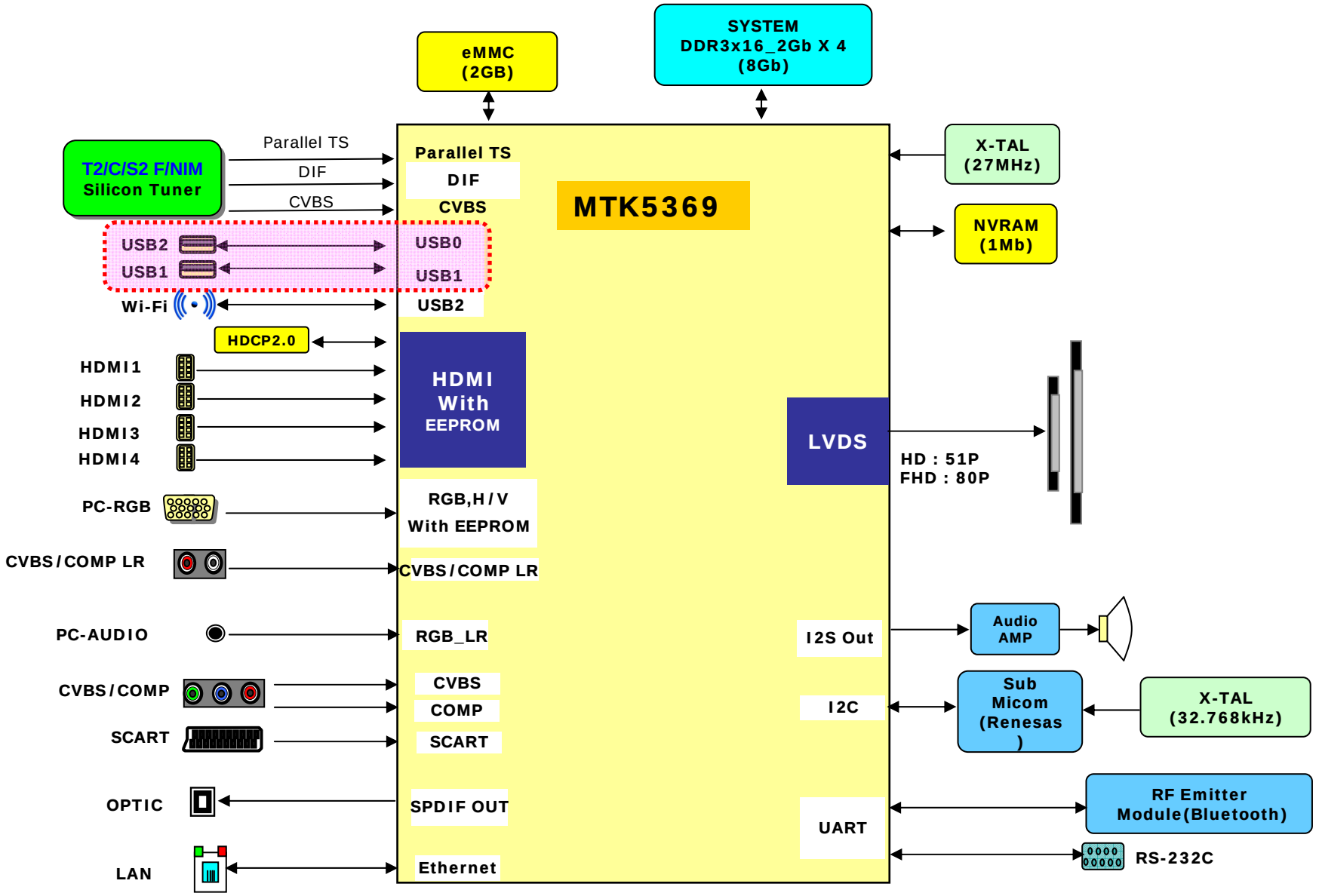
14. USB Trouble Shooting



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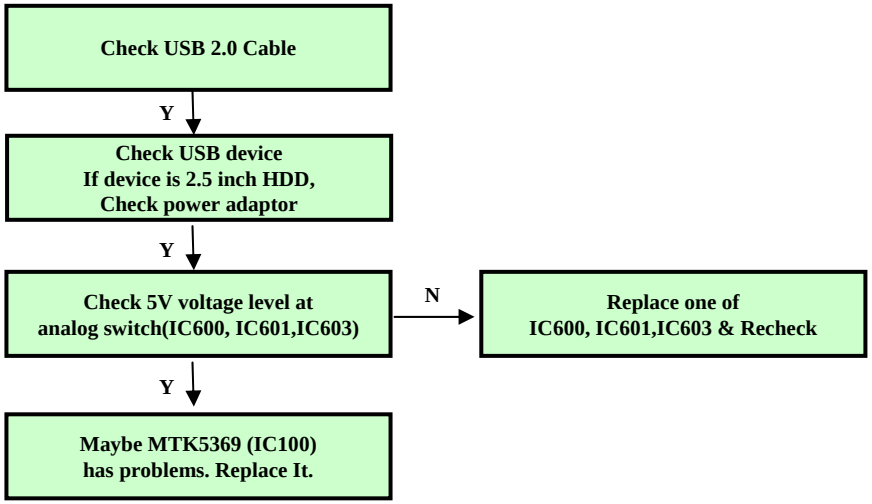
14. USB Trouble Shooting



• Exception
- USB power could be disabled by inrushing current
- In this case, remove the device and try to reboot the TV (AC power off/on)

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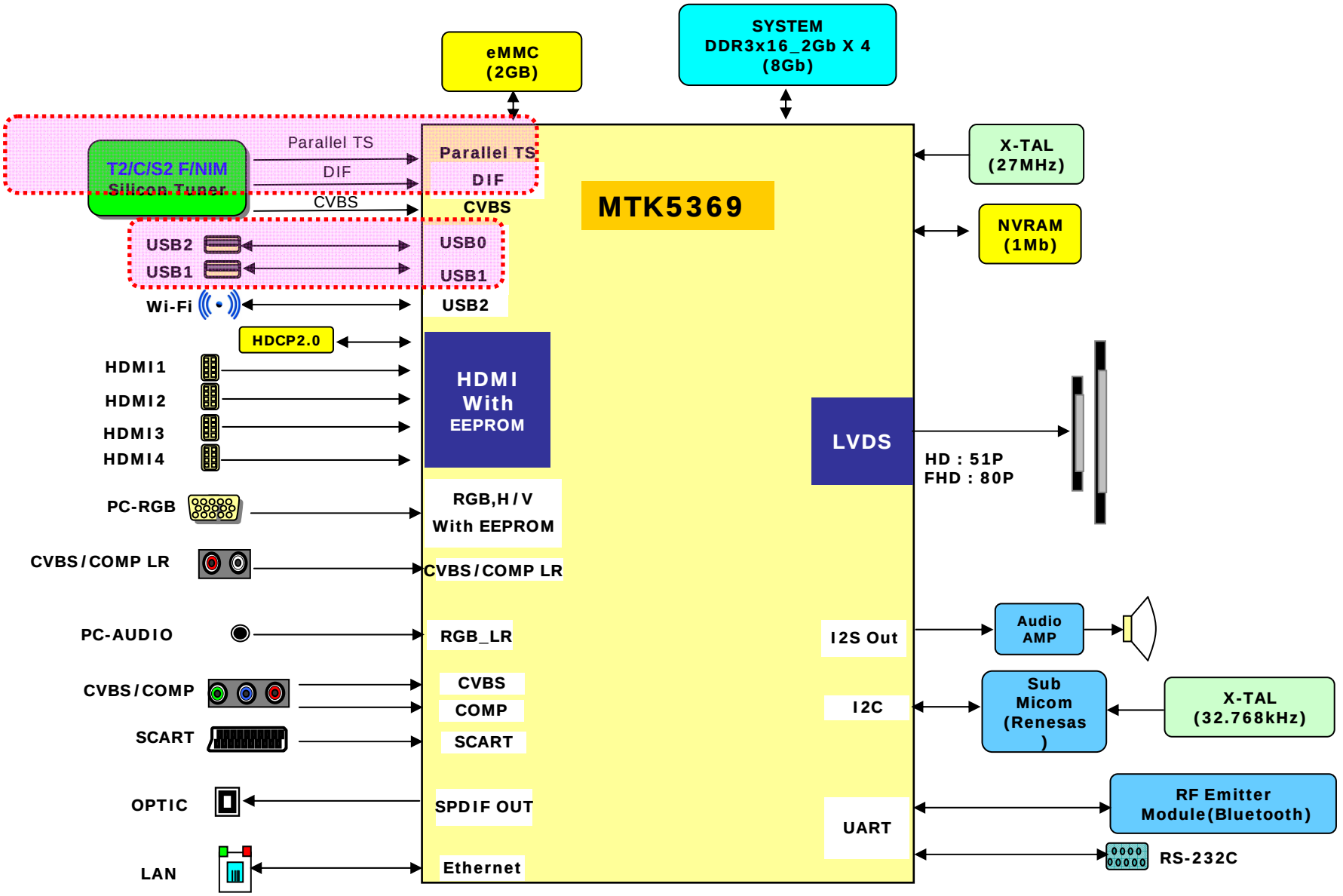
15. Digital TV Recording Fail Trouble Shooting



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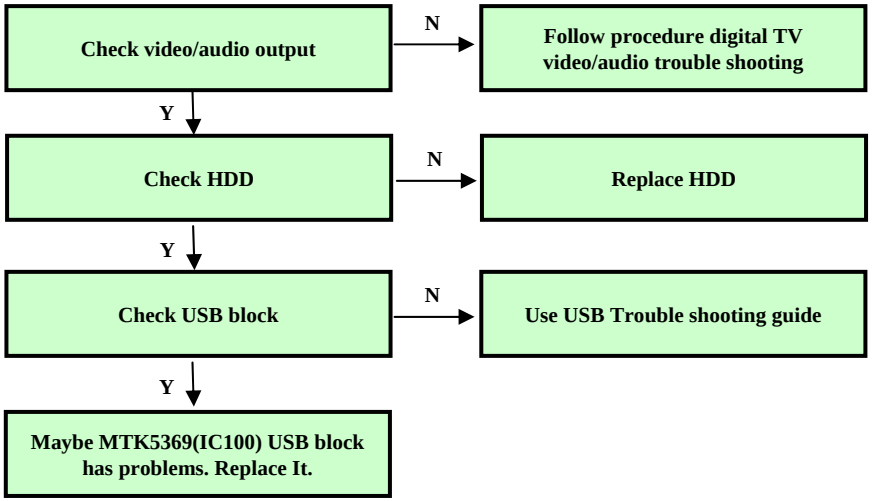
15. Digital TV Recording Fail Trouble Shooting



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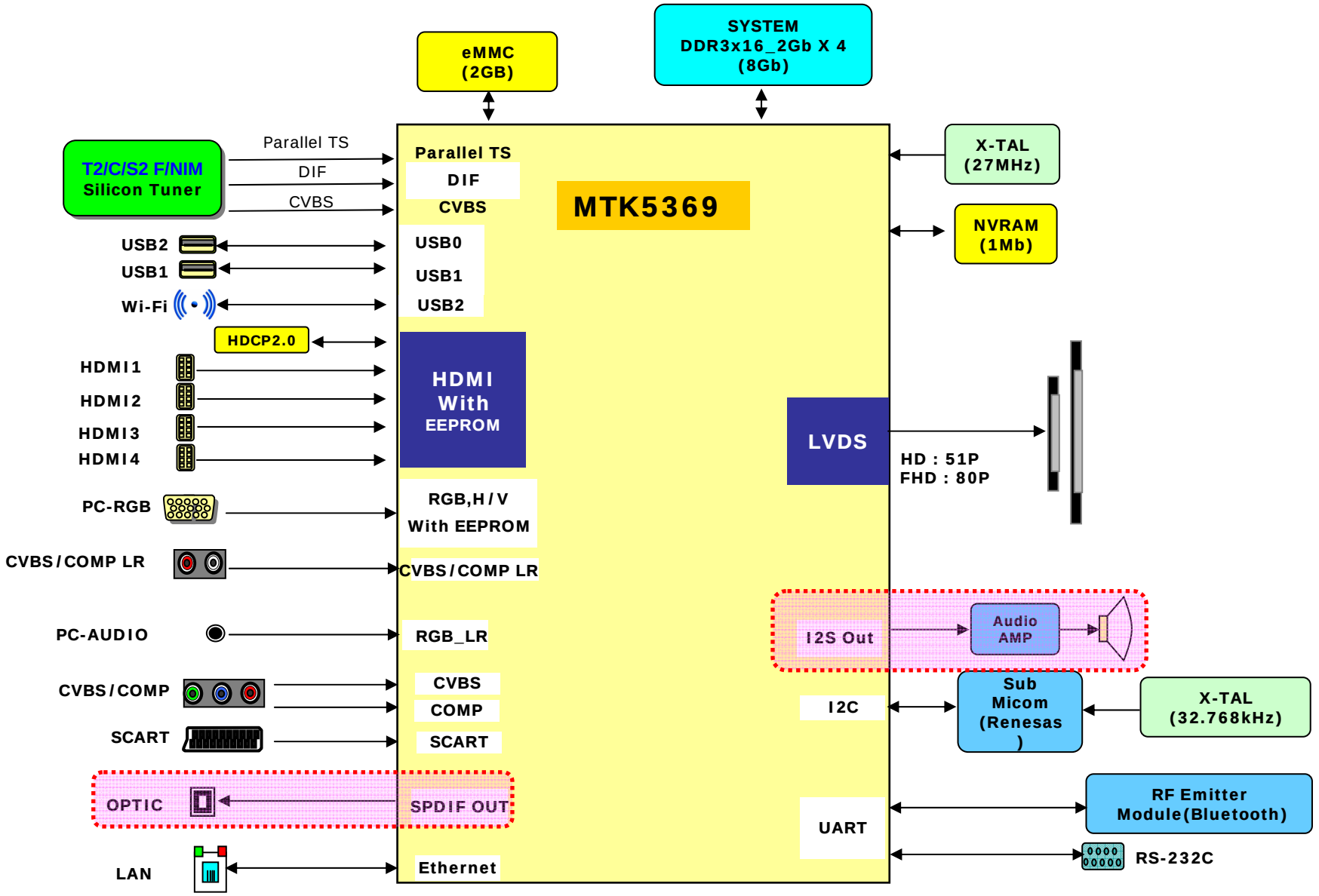
16. OPTIC Audio Out Trouble Shooting



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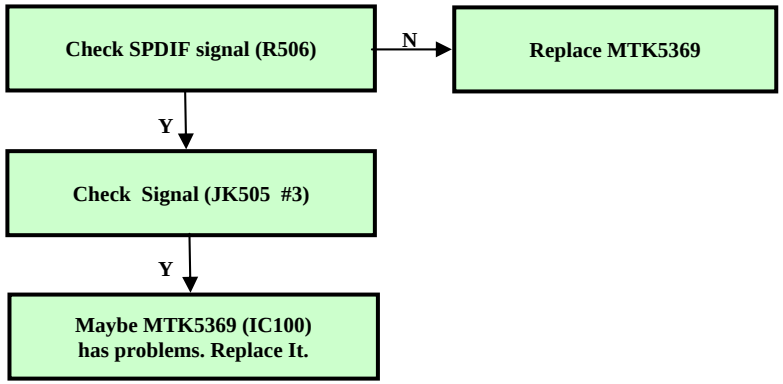
16. OPTIC Audio Out Trouble Shooting



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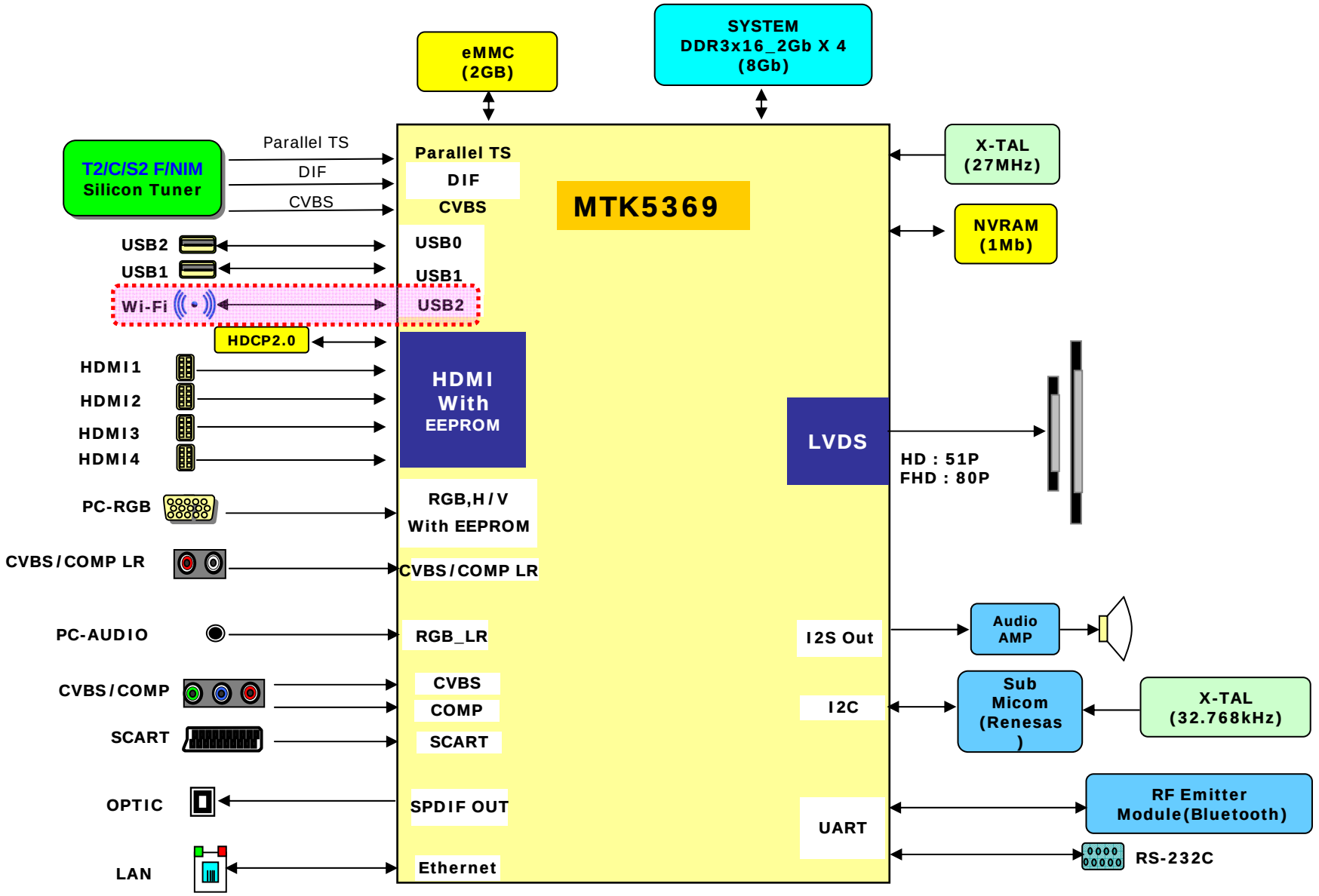
17. WIFI-B/I



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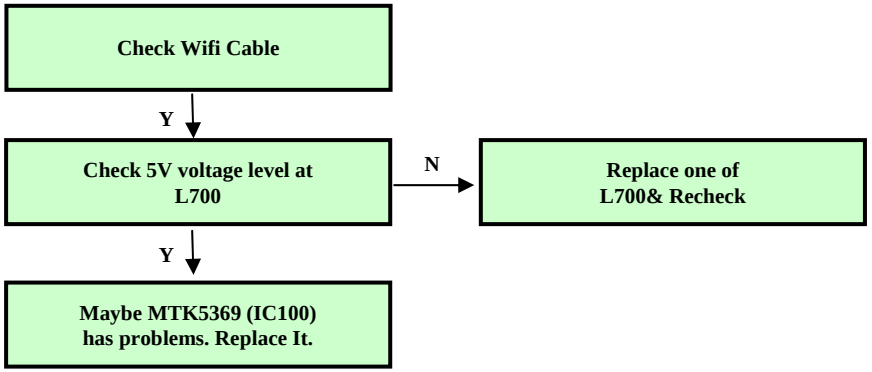
17. WIFI-B/I



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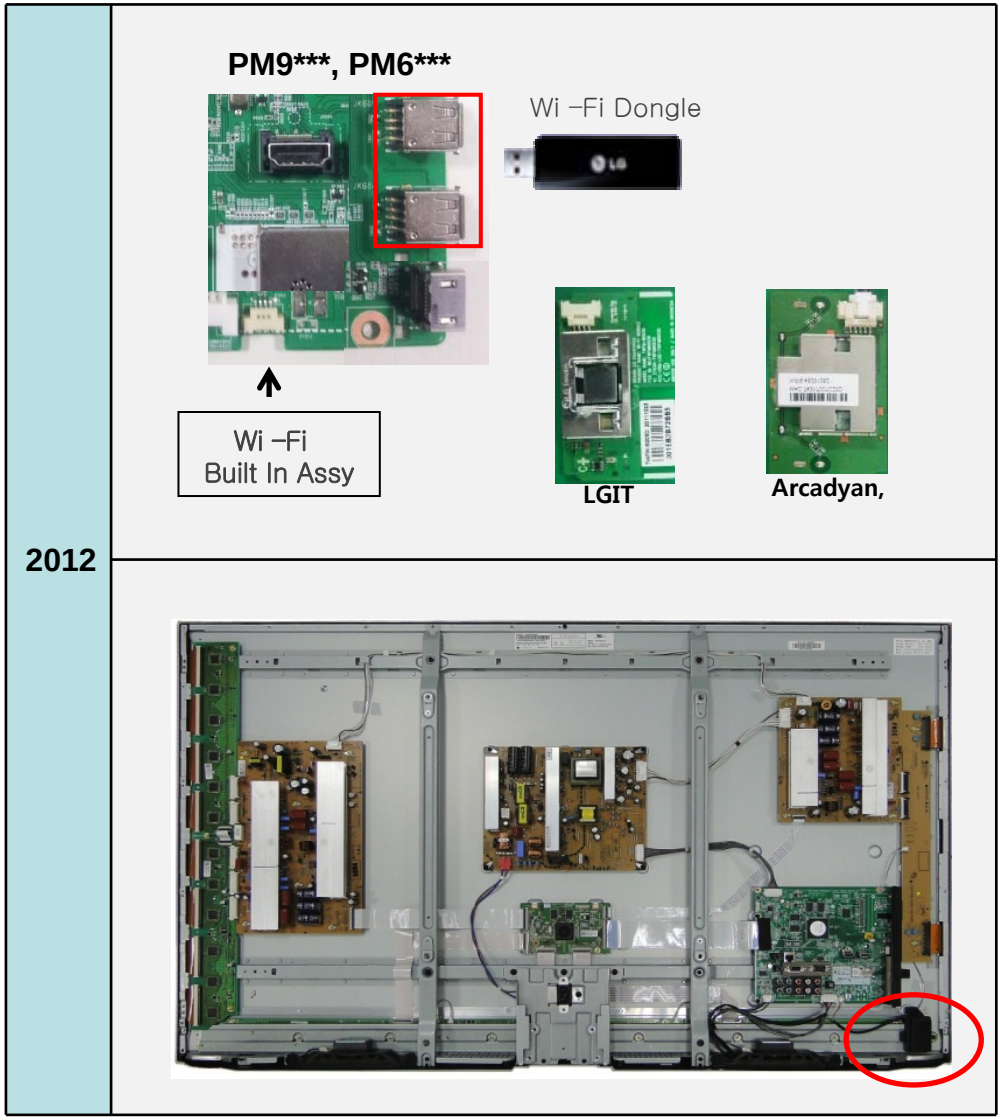
※ Wi-Fi function

	Wi-Fi
Platform	2012 GP4(MTK)
IC Maker	BCM
Maker P/N	BCM43236
Standard	802.11a/b/g/n
Interface	USB 2.0
Frequency	Dual [2.4/5.0 GHz]
Channel	20 / 40 MHz
Chip Size	10 * 10
Antenna	2 x 2 [Tx, Rx]
Speed	2 stream spatial Multi 300Mbps
ODM Company	Arcadyan, LGIT
Supply Type	Dongle Type & Built In



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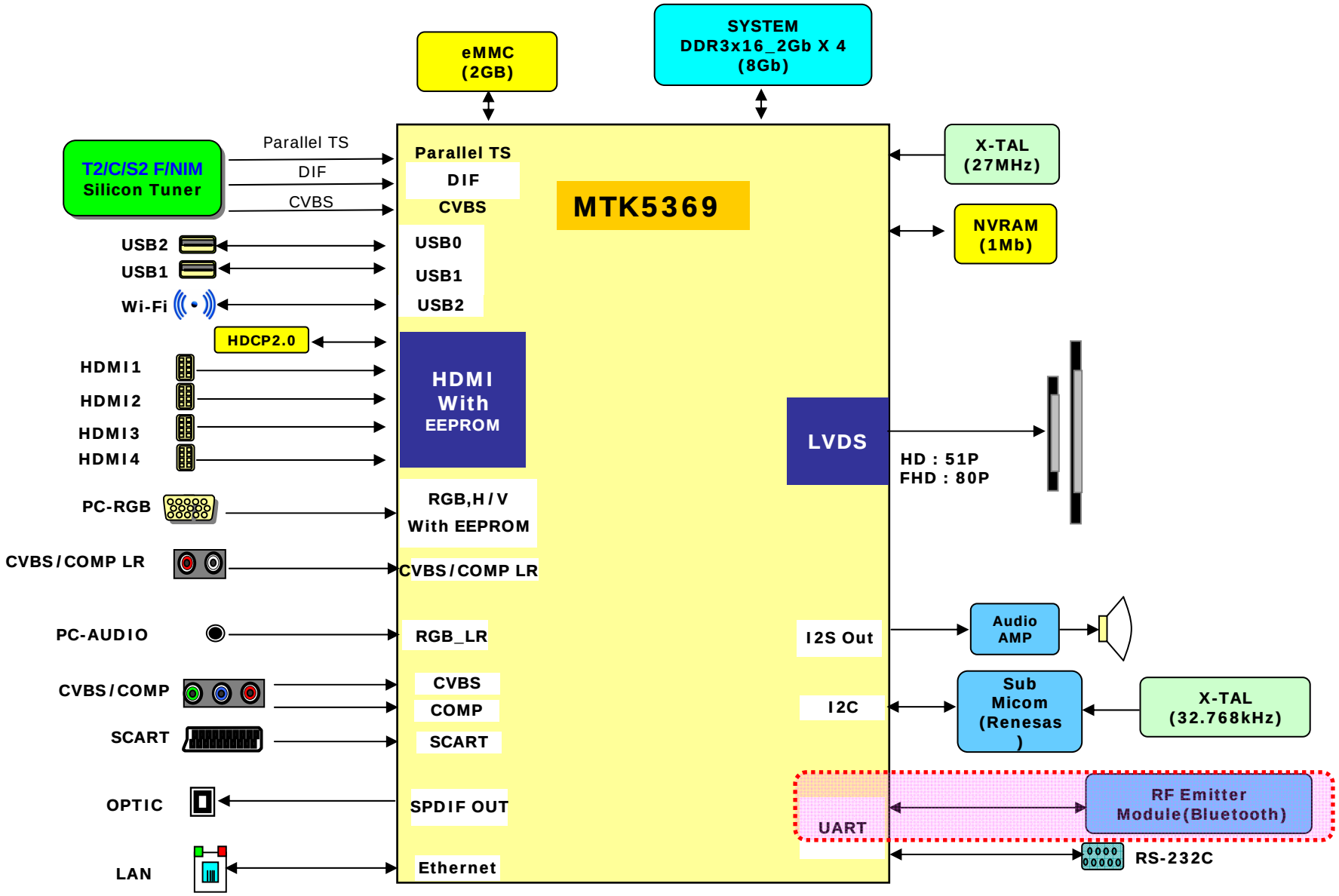
18. 3D Emitter



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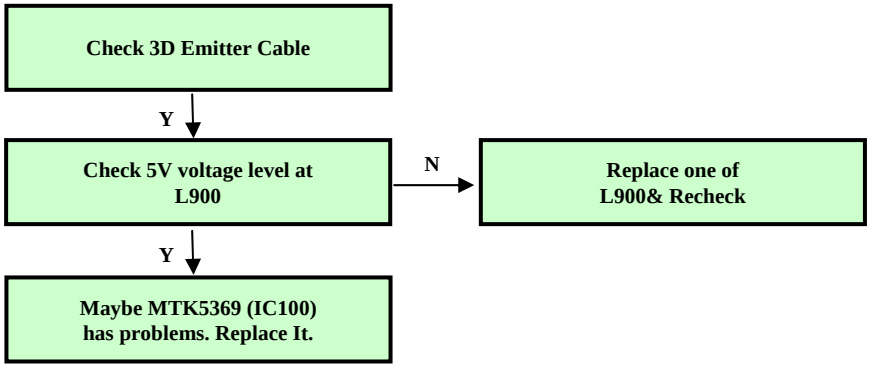
18. 3D Emitter



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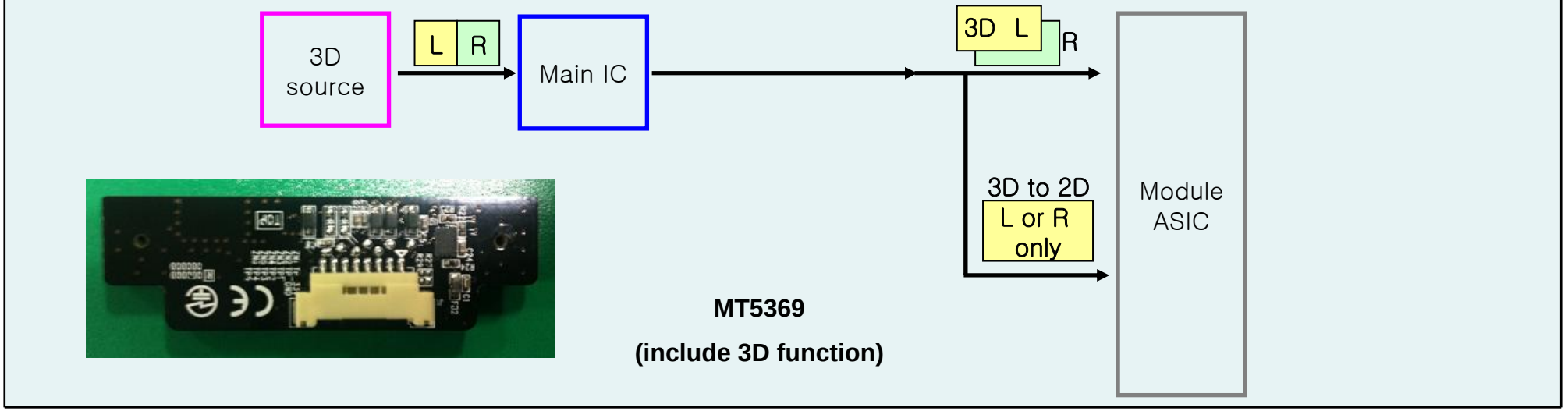
※ 3D function

Block Diagram



B/T Emitter Pin Map

No.	CONNECTOR PIN MAP		
	B/T Emiter	Direction	SPEC.
1	3.3V_Normal		3.3V Normal Power
2	GND		
3	UART_RX_RF	to DTV	• F/W update
4	UART_TX_RF	from DTV	
5	RESET_RF	from DTV	
6	ISP	from DTV	• F/W update (Not Use)
7	3D_SYNC_RF	from DTV	• 3D left/right frame sync signal (60Hz, 59.94Hz,50Hz, 48Hz, 47.95Hz)
8	GND		

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